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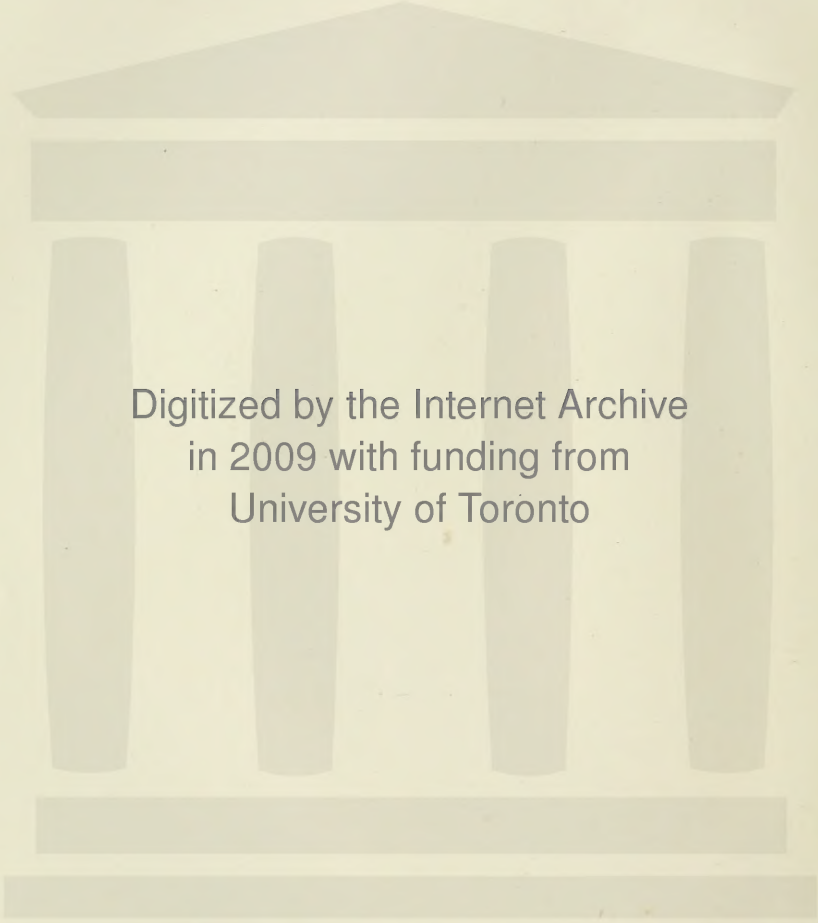
THE UNITED STATES OF AMERICA

EDITED BY

N. S. SHALER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ON THIS SITE IN FEDERAL HALL
APRIL 30 1789
GEORGE WASHINGTON
TOOK THE OATH AS THE FIRST PRESIDENT
OF THE UNITED STATES
OF AMERICA

Statue of George Washington, U. S. Sub-Treasury, New York.

S528u

THE UNITED STATES OF AMERICA

A STUDY OF THE AMERICAN COMMONWEALTH,
ITS NATURAL RESOURCES, PEOPLE,
INDUSTRIES, MANUFACTURES, COMMERCE,
AND ITS WORK IN LITERATURE, SCIENCE, EDUCATION,
AND SELF-GOVERNMENT

EDITED BY
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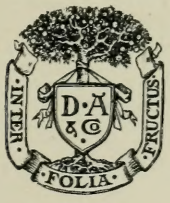
IN TWO VOLUMES
VOL. I

WITH MANY ILLUSTRATIONS



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1894

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INTRODUCTION.

THE American of to-day needs to know much concerning the present conditions of his country and the prospects of its future. Histories of his people, statistics such as the current reports afford, and special monographs, are valuable to him who has the time to use them, but the characteristic American citizen is a very busy man, and he is often deterred from inquiries which would inform him as to the state of the commonwealth by the amount of labor involved in the task of consulting a multitude of books. What he needs, as the publishers of these volumes believe, is to have the America of to-day unrolled before him like a map, in order that he may survey its natural features, its achievements, and the position which it has attained among the nations. Such a presentation demands that the results of many investigations be put in convenient order, and that this work be done by writers who are recognized authorities in the various subjects.

In a book of this nature, it is obvious that there should be brought to the attention of the reader first those matters which relate to the geographic, climatal, soil, and mineral conditions of the realm; he will thus obtain an idea of the stage on which he is to play his part; next he should be shown the actual station of those employments and other activities which make up our national life. As these tasks have been executed in this work, it is believed that it affords a better means for a clear understanding as to the position of the American citizen of to-day than is elsewhere to be found.

The reader can see at a glance the development and status of American industry and manufactures in the clear and succinct

tables and text prepared for this volume by Edward Atkinson. Specialists like Judge Cooley and H. G. Prout present the railways of the country in their relations to the public and in the condition of their actual operation. The work of Americans in education, science, literature, and art is well set forth, and the state of American cities—a subject of increasing consequence—is thoroughly dealt with by Col. Waring. The methods of national and State Government are explained by Prof. McMaster and the Hon. W. L. Wilson; while other equally competent authorities picture American life from the beginning to the present time. Yet other writers take account of the commerce of the seas and the work of the National Guard, as well as the questions which now affect our currency. These volumes thus present the thought of men qualified to speak with authority concerning the America of the end of the nineteenth century.

To our people, the matter of first importance is their present situation; from a study of it they may obtain the inspiration which the citizen needs to move him to high deeds in advancing the good work of his forefathers, or in remedying the ills which mar the great inheritance.

N. S. S.

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IMPORTANT EVENTS IN AMERICAN HISTORY.

870. Iceland discovered by the Northmen.
876 or 877. Greenland discovered by the Northman Gunnbjorn.
983. First colony in the New World planted by Eric the Red, at Ericsford, Greenland.
1000. North America discovered by Leif, the son of Eric the Red.
1002. Voyage of Thorvald, brother of Leif, to Vinland.
1007. Expedition under Thorfinn to Vinland, with birth of Snorri, first European child in North America.
1436. Christopher Columbus born in Genoa, Italy.
1467. Reported voyage of Columbus to Iceland.
1492. August 3. Columbus sailed with his fleet from Palos, Spain, for the New World.
1492. October 12. The New World (Watling's Island) discovered by Columbus.
1492. December 6. Hayti discovered by Columbus, who founded at Isabella the first Spanish colony in America.
1496. August 4. Santo Domingo, Hayti, the oldest permanent settlement in the New World, founded.
1497. June 24. North America discovered by John and Sebastian Cabot, probably the coast of Labrador.
1498. August 1. South America discovered by Columbus during his third voyage.
1499. First voyage of Amerigo Vespucci to the New World.
1500. First Portuguese expedition under Gaspar Cortereal explored the coast of the New World.
1506. First French expedition under Jean Denys explored the coast of the New World.
1507. The New World first called America in Cosmographie Introductio.
1512. April 2. Florida discovered by Juan Ponce de Leon.
1513. September 25. Pacific Ocean discovered by Vasco Nuñez de Balboa.
1519. March 4. Conquest of Mexico begun by landing of Hernando Cortes.
1524. March 10. Verrazzano, with a French expedition, arrived off the New World near Cape Fear, North Carolina.
1535. August 10. Jacques Cartier with French forces entered the St. Lawrence River and sailed to where Montreal now is.
1536. New Mexico, Colorado, and Arizona visited by Cabeza de Vaca.
1541. May 1. The Mississippi River discovered by Fernando de Soto.
1565. September 8. St. Augustine, Florida, the oldest town in the United States, founded by Pedro Menendez.

1578–'79. The western coast of North America explored by Sir Francis Drake, who called it New Albion.

1587. July. Settlement on Roanoke Island of colonists under John White sent out by Sir Walter Raleigh.

1587. August 18. Virginia Dare, first child of English parents born in the New World.

1602. May 14. An English colony under Benjamin Gosnold visited Cuttyhunk Island, Massachusetts.

1603. March 15. Samuel de Champlain left France to explore America.

1603. March. Pierre de Monts appointed by Henry IV of France, lieutenant-general of Acadia, extending from 40° to 46° north latitude.

1606. April 10. Patents granted by James I, of England, to Virginia companies.

1607. May 14. First permanent English settlement made in Jamestown, Virginia.

1608. July 3. First permanent French settlement made in Quebec, Canada.

1609. September 11. The Hudson River discovered by Henry Hudson, who entered New York Bay on September 3.

1614. A fort erected on Manhattan Island by the Dutch.

1620. December 21. The Pilgrim Fathers landed at Plymouth, making the first permanent English settlement in New England.

1621. July 1. The Dutch West India Company incorporated.

1622. First iron made in America by John Berkeley near Richmond, Virginia.

1623. May. First permanent Dutch settlement made in New York city.

1623. First settlement of Portsmouth and Dover, in New Hampshire, by Robert Gorges.

1623. First permanent settlement by the Dutch (Walloons) in Brooklyn, New York.

1629. March 3. The Massachusetts Bay Company founded by Charles I of England.

1630. The colony of Connecticut granted to the Earl of Warwick.

1630. September 7. First permanent settlement in Boston, Massachusetts.

1631. First iron mill built in New England in Lynn, Massachusetts.

1632. June 20. Maryland granted to Lord Baltimore by Charles I.

1634. March 25. First permanent settlement of Maryland, in St. Mary's, by Leonard Calvert.

1635. October. Roger Williams exiled by the General Court of Massachusetts.

1636. June. Providence, Rhode Island, founded by Roger Williams.

1636. October 28. Harvard College founded in Cambridge, Massachusetts.

1637. March 1. War declared against Pequod Indians by the colonies.

1638. April 18. Colony of New Haven founded by Puritans. It continued separate till 1665.

1638. April. First permanent Swedish settlement made, near Wilmington, Delaware.

1639. The first printing-press in the colonies erected in Cambridge, Massachusetts.

1643. The colonies of Massachusetts, Plymouth, New Haven, and Connecticut formed "The United Colonies of New England."

1645. Direct slave trade between New England and West Africa begun.

1647. First execution for witchcraft in New England.

1653. February 2. Proclamation by Governor Stuyvesant that New Amsterdam (now New York) had been made a city by the West India Company.

1661. Publication by John Eliot of the New Testament in the Indian dialect of Massachusetts.
1664. September 5. The New Netherlands surrendered to the English by Governor Stuyvesant.
1670. The Hudson Bay Company formed by grant to Prince Rupert and others from Charles II.
1675. June 24. King Philip's war broke out. It lasted a year.
1676. July. Nathaniel Bacon led a rebellion against Governor Berkeley in Virginia.
1681. Second printing-press in the colonies erected in Williamsburg, Virginia.
1681. February 24. Charles II granted a patent to William Penn of territory known as Pennsylvania.
1682. April 9. La Salle reached the Gulf of Mexico after having descended the Mississippi River from its junction with the Illinois River.
1682. October. Philadelphia, Pennsylvania, founded by William Penn.
1682. November 30. Penn signed a treaty with the Indians at Shackamaxon.
1683. October 17. The colony of New York adopted a "Charter of Liberties" under the governorship of Thomas Dongan.
1686. December 21. Arrival in Boston of Sir Edmund Andros, who had been made Governor-General of New England by James II.
1689. June. France declared war against England, followed by the massacre of various English colonists by Indians.
1689. Total population of English colonies estimated at 200,000.
1692. March 1. Arrest of Sarah Good, and beginning of Salem witchcraft panic.
1693. College of William and Mary founded near Williamsburg, Virginia.
1697. September 20. Peace of Ryswick concluded the war between France and England.
1700. First public library in America, founded in New York city.
1700. November 11. Yale College founded in Saybrook, Connecticut.
1701. June 24. First permanent settlement made in Michigan, at Detroit.
1702. May 15. England declared war against France and Spain. This War of the Spanish Succession lasted till 1713.
1704. April 24. The Weekly Boston News Letter, the first regular newspaper issued in America, began publication.
1706. January 17. Benjamin Franklin born in Boston, Massachusetts.
1710. A postal service for the colonists, created by Parliament, with chief office in New York city.
1710. October 2. Port Royal (now Annapolis, N. S.) surrendered to an expedition of the colonists from Boston, Massachusetts.
1711. A regular weekly mail established between Boston and Maine, and a bi-weekly mail between Boston and New York.
1711. July 30. An Anglo-colonial expedition left Boston to conquer Canada, but, being unsuccessful, returned in August.
1712. September. A monopoly of the trade in Louisiana granted by Louis XIV to Antoine Crozat.
1713. April 11. The Peace of Utrecht signed, by which France cedes Acadia, Hudson Bay and its borders, and Newfoundland to Great Britain.
1714. Alabama settled by the French, who built Fort Toulouse at the junction of the Coosa and Tallapoosa rivers.
1718. July 30. Death of William Penn in Berkshire, England.

1718. August. First permanent settlement in New Orleans, Louisiana, by the French under Bienville.
1719. The American Weekly, the second paper to be issued in America, began publication in Philadelphia, Pennsylvania.
1722. Third Indian war in New England.
1725. October 16. The New York Gazette, issued by William Bradford, began publication.
1729. August. First permanent settlement of Baltimore, Maryland.
1730. The first paper-mill in New England, erected in Milton, Massachusetts.
1730. A line of stages established to make bimonthly trips between New York and Philadelphia.
1732. February 22. George Washington born in Westmoreland County, Virginia.
1732. June 9. The province of Georgia created by a grant of George II to James Oglethorpe.
1733. February 12. Savannah, Georgia, first settled by James Oglethorpe with English colonists.
1735. The first foreign newspaper (German) printed in America in Germantown, Pennsylvania.
1741. Bering discovered the Aleutian Islands and Bering Strait.
1741. The General Magazine and Historical Chronicle, the first literary periodical published in the colonies, established in Philadelphia by Benjamin Franklin.
1744. March 31. France declared war against England, called King George's War.
1745. June 17. Louisburg, Cape Breton, surrendered to an Anglo-colonial force.
1746. College of New Jersey, in Princeton, New Jersey, chartered.
1748. October 7. Peace of Aix-la-Chapelle signed between France, England, and Spain.
1752. Benjamin Franklin made experiments with electricity.
1754. October 31. King's (now Columbia) College, in New York city, chartered.
1755. May 18. England declared war against France.
1755. July 9. General Braddock defeated by the Indians while advancing to attack Fort Duquesne (near Pittsburg, Pennsylvania).
1759. September 18. Quebec surrendered by Marquis de Montcalm to General Wolfe.
1760. September. Canada surrendered to the English under Lord Amherst.
1761. June 6. Transit of Venus observed in Newfoundland by a party from Harvard College under Professor John Winthrop, being the first college scientific expedition ever sent out in the United States.
1763. February 10. Treaty of Paris signed, by which Canada is ceded to England.
1764. February 15. First permanent settlement in St. Louis, Missouri, by Pierre L. Laclede.
1764. April 5. The Stamp Act passed by the British Parliament.
1765. October 7. First Continental Congress met in New York city and adopted a "Declaration of Rights and Grievances."
1766. March 28. The Stamp Act repealed by the British Parliament.
1770. March 5. The Boston Massacre took place.
1770. Total population of English colonies estimated at 2,312,000.
1773. Shipments of tea from England with tax, imported by the East India Company.

1773. The first steam engine constructed in America in Philadelphia, Pennsylvania.
1774. September 5. A Continental Congress met in Philadelphia, with Peyton Randolph as president.
1775. April 19. Battles in Lexington and Concord, Massachusetts.
1775. May 10. A Continental Congress met in Philadelphia, with John Hancock as president.
1775. June 15. George Washington appointed commander in chief of the colonial forces.
1775. July 4. General Washington took command of the Colonial forces in Cambridge, Massachusetts.
1775. December 30. Unsuccessful attempt made to capture Quebec, Canada, with death of General Montgomery.
1776. March 17. Boston evacuated by the British under Lord Howe.
1776. July 2. Adoption of the Declaration of Independence.
1776. August 27. Repulse of the Americans at the battle of Long Island.
1776. October 9. San Francisco, California, founded by the building of a Spanish mission.
1776. December 25, 26. General Washington crossed the Delaware and surprised the Hessians at Trenton, New Jersey.
1777. June 14. The flag of stars and stripes adopted by Congress.
1777. July 31. Marquis de Lafayette commissioned a major general in the American army.
1777. October 7. Surrender of General Burgoyne, with 6,000 British troops, to General Gates.
1778. February 6. The independence of the American colonies acknowledged by France.
1778. April 3. The first New York Legislature passed a law regulating State militia. Other States passed similar laws at about the same time.
1778. June 28. Battle of Monmouth, with defeat of Sir Henry Clinton by General Washington.
1778. July 4. Defeat of the Indians at Kaskaskia, Illinois, by General George Rogers Clark.
1778. July 11. Arrival off Sandy Hook of French fleet under Count d'Estaing.
1779. July 15. Capture of Stony Point by the Americans under General Wayne.
1779. September 22. Naval victory of the Bon Homme Richard over the British frigate Serapis.
1780. September 22. Treason of Benedict Arnold discovered.
1780. October 3. Major André hanged as a spy in Tarrytown, New York.
1781. January 17. Battle of Cowpens.
1781. October 19. Surrender of Lord Cornwallis, with 7,000 British soldiers, to General Washington.
1781. December 31. The Bank of North America, in Philadelphia, incorporated by Act of Congress, the first in the United States.
1782. First Bible printed in America by Robert Aitkin in Philadelphia, Pennsylvania.
1782. November 30. Preliminary treaty of peace between Great Britain and the United States, signed in Paris.
1783. The American Spelling Book, by Noah Webster, published.
1783. April 3. Washington Irving born in New York city.

1783. September 3. Treaty of peace signed, by which Great Britain acknowledged the independence of the United States.
1783. November 25. New York city evacuated by the British.
1784. The Pennsylvania Packet, or the General Advertiser, the first daily newspaper in America, began publication in Philadelphia, Pennsylvania.
1784. November 14. Rev. Samuel Seabury consecrated first bishop of the Protestant Episcopal Church in the United States.
1786. December 9. Shays's rebellion begun in Massachusetts.
1787. May 14. Constitutional Convention met in Philadelphia, with George Washington as president.
1787. July 13. Northwest Territory organized as proposed by Thomas Jefferson.
1787. September 17. Majority of the delegates signed the Constitution.
1787. The manufacture of salt from wells near Syracuse, New York, begun.
1788. Cincinnati, Ohio, first settled by John C. Symmes.
1788. John Greenwood opened an office in New York city as a dentist, the first in the United States.
1788. June 21. New Hampshire having ratified the Constitution; its acceptance was assured.
1789. March 4. The first national Congress assembled in New York city.
1789. April 30. George Washington inaugurated first President of the United States.
1789. July 4. First tariff law passed by Congress.
1789. July 27. Department of Foreign Affairs of State created, with Thomas Jefferson as first Secretary.
1789. August 7. Department of War created, with Henry Knox as first Secretary.
1789. September 2. Department of the Treasury created, with Alexander Hamilton as first Secretary.
1789. September 22. The Post-office Department created, with Samuel Osgood as first Postmaster-General.
1789. September 26. John Jay appointed first Chief Justice of the United States.
1879. September 27. Department of Justice created, with Edmund J. Randolph as first Attorney-General.
1789. November 6. The Diocese of the United States created by the appointment of Rev. John Carroll as the first Roman Catholic bishop.
1790. The first census showed the population to be 3,929,326.
1790. February 4. The United States Supreme Court created.
1790. April 15. The first patent-right law passed by Congress.
1790. May 31. The first copyright law passed by Congress.
1790. June 5. The steamboat invented by John Fitch made a trip up the Delaware River.
1790. July 16. The District of Columbia ceded to the national Government.
1791. Anthracite coal discovered in Carbon and adjacent counties of Pennsylvania.
1791. The first American whaling ship to the Pacific sailed from Nantucket, Massachusetts.
1791. Cotton spinning successfully established in the United States, in Pawtucket, Rhode Island.
1791. February 9. First savings bank created in Philadelphia by act of Congress.
1791. March 4. Vermont admitted into the Union as a State.
1791. September 9. Washington City so named in honor of George Washington.

1791. November 4. Defeat of troops under General St. Clair, by the Indians, near Miami village, Ohio.
1792. June 1. Kentucky admitted to the Union.
1792. September 7. The first United States Mint opened in Philadelphia, Pennsylvania.
1793. The cotton gin invented by Eli Whitney.
1793. Clocks first made by Eli Terry, in Plymouth, Connecticut.
1793. February 12. First fugitive-slave law passed by Congress.
1794. March 27. An act of Congress authorized the construction of six frigates as the foundation of a navy.
1794. August 20. Defeat of the Indians by General Wayne near the Miami rapids, Ohio.
1794. August–September. The whisky insurrection in western Pennsylvania.
1794. November 3. William Cullen Bryant born in Cummington, Massachusetts.
1796. June 1. Tennessee admitted to the Union.
1797. March 4. John Adams inaugurated President.
1797. The French Directory issued a decree against American commerce.
1797. The Medical Repository, the first scientific periodical in the United States began publication in New York city.
1797. The first American vessel launched on Lake Erie, near Erie, Pennsylvania.
1798. April 7. The Mississippi Territory established by act of Congress.
1798. Department of the Navy created, with George Cabot as first secretary.
1798. Alien and sedition acts passed by Congress.
1798. All commercial relations with France suspended by act of Congress.
1799. December 14. George Washington died at Mount Vernon, Virginia.
1800. The African Methodist Episcopal Zion Church founded.
1800. The second census showed the population to be 5,308,483.
1800. November 22. The first meeting of Congress in Washington City, whither the national capital had been transferred.
1801. January 20. John Marshall made Chief-Justice of the United States.
1801. March 4. Thomas Jefferson inaugurated President.
1801. June 10. Tripoli declared war against the United States.
1802. The United States Military Academy founded at West Point, New York.
1802. November 29. Ohio admitted to the Union.
1803. April 30. Louisiana purchased from France for $15,000,000.
1803. May 25. Ralph Waldo Emerson born in Boston, Massachusetts.
1804. Chicago first settled by John Kinzie, who built a trading-post there.
1804. The Middlesex Canal, connecting Boston with the Concord River, completed, being the first canal opened for transportation in the United States.
1804. March. Lewis and Clarke started on their exploration of the northwest part of the United States.
1804. July 4. Nathaniel Hawthorne born in Salem, Massachusetts.
1805. June 3. Tripoli made peace with the United States.
1807. February 27. Henry Wadsworth Longfellow born in Portland, Maine.
1807. May 22. Aaron Burr's trial for treason began, and resulted in his acquittal on September 1.
1807. August 11. The steamboat Clermont, built by Robert Fulton, made its first trip from New York city to Albany, New York.

1807. December 22. The Embargo Act passed by Congress, forbidding the departure of any vessel from the United States for a foreign port.
1808. The steamboat Phœnix, built by John Stevens, made the trip from Hoboken, New Jersey, to Philadelphia, Pennsylvania, being the first sea trip made under steam by any vessel.
1809. January 19. Edgar Allan Poe born in Boston, Massachusetts.
1809. March 4. James Madison inaugurated President.
1809. August 29. Oliver Wendell Holmes born in Cambridge, Massachusetts.
1810. The third census showed the population to be 7,239,881.
1811. October 27. The first steamboat left Pittsburg, Pennsylvania, by the Ohio and Mississippi Rivers for New Orleans, Louisiana.
1811. November 7. Defeat of the Indians, under Tecumseh, at Tippecanoe, Indiana, by General Harrison.
1812. April 30. Louisiana admitted to the Union.
1812. June 18. War declared against Great Britain by the United States.
1812. August 19. Naval fight between the United States vessel Constitution and the British frigate Guerrière.
1813. June 1. Naval fight between the United States frigate Chesapeake and the British frigate Shannon.
1813. September 13. The British defeated by Commodore Perry in a naval fight on Lake Erie.
1814. July 25. Battle of Lundy's Lane.
1814. August 25. The British captured Washington City and burned many buildings.
1814. December 24. Treaty of peace signed in Ghent between Great Britain and the United States.
1815. January 8. Battle of New Orleans, in which the British were defeated by General Jackson.
1815. March. The Dey of Algiers declared war against the United States.
1815. May. First issue of the North American Review.
1816. First Seminole War.
1816. December 2. The first savings bank in the United States opened in Philadelphia, Pennsylvania.
1816. December 11. Indiana admitted to the Union.
1817. The United States Coast Survey began its actual work.
1817. March 4. James Monroe inaugurated President.
1817. July 4. The construction of the Erie Canal begun.
1817. December 10. Mississippi admitted to the Union.
1818. Steam navigation begun on Lake Erie.
1818. July. First issue of the American Journal of Science, by Benjamin Silliman.
1818. December 3. Illinois admitted to the Union.
1819. February 22. Treaty for the cession of Florida concluded between Spain and the United States,
1819. May 21. The steamship Savannah made the first trip across the Atlantic from Savannah to Liverpool, where it arrived on June 20, having stopped at New York.
1819. Great financial depression.
1819. December 14. Alabama admitted to the Union.
1820. The fourth census showed the population to be 9,633,822.

1820. March 15. Maine admitted to the Union.
1821. The first edition of Webster's Dictionary published.
1821. February 26. The Missouri Compromise Bill adopted by Congress.
1821. July 1. Florida taken possession of by General Jackson for the United States.
1821. August 10. Missouri admitted to the Union.
1823. The first steam power printing-press set up in Albany, New York.
1824. The Rensselaer Polytechnic Institute founded in Troy, New York.
1824. Geological survey of North Carolina begun by Denison Olmsted.
1824. August 15. Lafayette arrived at Staten Island, New York, on a visit to the United States.
1825. March 4. John Quincy Adams inaugurated President.
1825. June 17. Corner-stone of Bunker Hill Monument, in Boston, laid by Lafayette.
1825. October 26. Erie Canal opened by boats leaving Buffalo, New York; they reach New York city on November 4.
1825. November 29. First performance of Italian opera in the United States, given in New York city.
1826. Founding of the National Academy of Design in New York city.
1826. October 7. The first railroad constructed in the United States with metallic tracks opened, extending from Quincy, Massachusetts, to tidewater.
1827. January 8. The Switchback Railroad at Mauch Chunk, Pennsylvania, opened.
1829. March 4. Andrew Jackson inaugurated President.
1830. The fourth census showed the population to be 12,866,020.
1830. The first astronomical telescope in the United States erected at New Haven, Connecticut, by Yale College.
1830. The manufacture of lead pencils, by Joseph Dixon, begun in Salem, Massachusetts.
1830. The South Carolina Railroad, the first steam railway for passenger traffic, began running.
1830. April 6. The first Mormon Church organized by Joseph Smith, in Manchester, New York.
1830. August 3. Welland Canal, connecting Lakes Erie and Ontario, completed.
1830. August 4. The city of Chicago, Illinois, laid out.
1831. October 2. Announcement of discovery of chloroform by Samuel Guthrie, of Sackett's Harbor, New York.
1832. The Black Hawk War began.
1832. June 21. First appearance of Asiatic cholera in the United States, in New York city.
1832. November. First street railway in the United States opened for travel. ran from the City Hall to Fourteenth Street, in New York city.
1833. January. First issue of The Knickerbocker Magazine.
1833. The Government funds withdrawn from the United States Bank.
1835. First house built in San Francisco, California.
1835. Revolving pistol patented by Samuel Colt.
1835. November 7. Texas declared its independence.
1835. December. Second Seminole War began.
1836. March 6. Capture of the Alamo in the Texan war for independence.

1836. June 15. Arkansas admitted to the Union.
1837. January 26. Michigan admitted to the Union.
1837. March 4. Martin Van Buren inaugurated President.
1837. May 10. Specie payment suspended by all New York city banks, and general financial depression.
1838. The Smithsonian Institution founded in Washington City.
1838. First zinc smelted in the United States, at Washington City, from zinc ores from New Jersey.
1838. August 18. Captain Charles Wilkes started on his South Sea Exploring Expedition.
1839. February 24. Charles Goodyear obtained his first patent for the vulcanization of India rubber.
1839. March 4. The express business begun in the United States, by W. F. Harnden, who established a line between Boston and New York.
1839. October 10. Failure of the United States Bank.
1839. November. The first photographic portrait from life taken by John W. Draper, in New York city.
1840. July 4. The first Cunard steamer, the Britannic, left Liverpool for Boston.
1840. The fifth census showed the population to be 17,069,453.
1841. March 4. William Henry Harrison inaugurated President.
1841. First steam fire engine in the United States completed and put into use in New York city.
1841. April 4. President Harrison died, and is succeeded by Vice-President Tyler.
1841. April 10. First issue of the New York Tribune, edited by Horace Greeley, appeared.
1842. May 18. Attempted seizure of arsenal at Providence, Rhode Island, by Thomas W. Dorr, constituting Dorr's Rebellion.
1842. June 10. Lieutenant Frémont started on his first Western exploring expedition.
1842. October 18. Submarine telegraph wire laid between New York city and Governor's Island by S. F. B. Morse.
1842. November 10. Treaty between the United States and Great Britain, settling the northwestern boundary, proclaimed by the President.
1843. First screw steam war vessel, the Princeton, built by Captain Ericsson.
1844. Copper mining in Lake Superior region begun.
1844. September 24. S. F. B. Morse demonstrated the feasibility of the electric telegraph by sending a message from Baltimore, Maryland, to Washington City.
1845. United States Naval Academy founded in Annapolis, Maryland.
1845. Petroleum obtained by boring in Tarentum, near Pittsburg, Pennsylvania.
1845. March 1. The annexation of Texas authorized by President Tyler.
1845. March 3. Florida admitted to the Union.
1845. March 4. James K. Polk inaugurated President.
1845. December 29. Texas admitted to the Union.
1846. April 24. First engagement in the Mexican War.
1846. May 8. Battle of Palo Alto.
1846. May 11. The United States declared war against Mexico.
1846. July 5. California declared itself independent of Mexican rule.
1846. August 8. The Wilmot Proviso introduced into Congress.

1846. September 10. Elias Howe, Jr., received his first patent for sewing machine.
1846. September 30. First use of sulphuric ether as an anæsthetic in surgery.
1846. Salt Lake City, Utah, selected as a site for the Mormons.
1846. December 28. Iowa admitted to the Union.
1847. February 8. Annexation of California proclaimed by Commodore Shubrick.
1847. February 22, 23. Defeat of the Mexicans at Buena Vista by General Taylor.
1847. March 27. Vera Cruz surrendered to General Scott.
1847. September 14. City of Mexico taken by General Scott.
1847. Pig-iron first converted into steel by William Kelly in Kentucky, who decarbonized the iron by a current of air.
1848. January 18. Gold discovered in California by John W. Marshall.
1848. February 2. Treaty of peace between the United States and Mexico, signed in Guadalupe Hidalgo.
1848. May 29. Wisconsin admitted to the Union.
1848. September 20. First meeting of the American Association for the Advancement of Science, held in Philadelphia, Pennsylvania.
1849. Department of the Interior created, with Thomas Ewing as first Secretary.
1849. January. The first diploma given in the United States to woman physician, granted to Elizabeth Blackwell, in Geneva, New York.
1849. New York Associated Press founded.
1849. March 5. Zachary Taylor inaugurated President.
1850. January 29. The Clay compromise resolutions introduced into Congress.
1850. The sixth census showed the population to be 22,191,876.
1850. April 1. Convention held in Philadelphia to consider the construction of a transcontinental railroad.
1850. June. First issue of Harper's New Monthly Magazine.
1850. July 4. The Clayton-Bulwer Treaty promulgated by the President.
1850. July 9. President Taylor died and Vice-President Millard Fillmore succeeded to the presidency on July 10.
1850. August 23. The fugitive-slave bill passed by Congress.
1850. September 9. California admitted to the Union.
1851. May 14. The New York and Lake Erie Railroad completed from Piermont, New York, to Dunkirk, New York.
1851. October 8. The Hudson River Railroad completed from New York city to Albany, New York.
1852. June 29. Henry Clay died, aged seventy-five years.
1852. October 24. Daniel Webster died, aged seventy years.
1852. November 24. Commodore Perry departed from Norfolk, Virginia, for Japan.
1853. March 4. Franklin Pierce inaugurated President.
1853. May. South Pacific Exploring Expedition departed from Norfolk, Virginia, under command of Captain Ringgold.
1853. July 14. A World's Fair opened in Crystal Palace, New York city.
1853. July 14. The expedition under Commodore Perry arrived in Japan, and delivered the President's letter.
1853. October 11. New York Clearing House began operations.
1854. March 1. The New York, Newfoundland, and London Telegraph Company organized by Cyrus W. Field, Peter Cooper, and others.
1854. March 31. The Kansas-Nebraska Bill introduced by Senator Douglas, signed by the President.

1854. March 31. Treaty with Japan signed.
1855. January. First bridge across the Mississippi River built at Minneapolis, Minnesota.
1855. January 28. The railroad between Colon and Panama completed.
1855. March. Suspension bridge across the Niagara River completed.
1856. Manufacture of condensed milk begun in the United States, in Litchfield, Connecticut.
1856. Bessemer steel made in Phillipsburg, New Jersey.
1856. Introduction of sorghum into the United States.
1857. March 4. James Buchanan inaugurated President.
1857. March 6. Dred Scott decision made by Chief-Justice Taney.
1857. August 24. The suspension of the Ohio Life and Trust Company began the financial crisis that extended through the country.
1858. Cooper Union, in New York city, given to the public by Peter Cooper.
1858. May 11. Minnesota admitted to the Union.
1858. August 4, 5. Successful completion of the first Atlantic cable.
1859. February 14. Oregon admitted to the Union.
1859. August 26. Boring of the first well for petroleum in Titusville, Pennsylvania, by E. L. Drake.
1859. October 16. Raid on Harper's Ferry by John Brown.
1860. The seventh census showed the population to be 31,443,321.
1860. December 17. South Carolina adopted an ordinance of secession.
1861. January 9. First shot of the civil war fired against the Star of the West, in Charleston harbor, South Carolina.
1861. January 9, Mississippi; 10, Florida; 11, Alabama; 19, Georgia; 26, Louisiana; 30, North Carolina, seceded from the Union.
1861. January 29. Kansas admitted to the Union.
1861. February 1. Texas seceded from the Union.
1861. February 9. Provisional Confederate Government organized in Montgomery, Alabama.
1861. February 18. Jefferson Davis inaugurated provisional President of the Confederate States.
1861. March 4. Abraham Lincoln inaugurated President.
1861. April 14. Surrender of Fort Sumter to the Confederates.
1861. April 17. Virginia seceded from the Union.
1861. May 3. President Lincoln called for 75,000 volunteers.
1861. June 10. Battle of Big Bethel.
1861. July 21. The first battle of Bull Run.
1861. October 25. Telegraph line connecting St. Louis and San Francisco completed.
1861. November 8. The Confederate envoys, James M. Mason and John Slidell, taken from British steamer Trent, by Captain Wilkes.
1861. December 30. Cash payments suspended by banks in New York city and elsewhere.
1862. February 16. Fort Donelson surrendered to General Grant.
1862. March 9. Naval fight between the Merrimac and the Monitor.
1862. April. The National Guard of New York created by law in accordance with national requirements. Other States passed similar laws.
1862. April 6, 7. Battle of Pittsburg Landing (Shiloh).

1862. April 24. New Orleans surrendered to Admiral Farragut.
1862. July 1. The battle of Malvern Hills closed a seven days' struggle between General Lee and General McClellan.
1862. July 1. President Lincoln called for 300,000 volunteers.
1862. August 29, 30. The second battle of Bull Run.
1862. September 17. Battle of Antietam.
1862. October 8. Battle of Perryville.
1862. December 13. Battle of Fredericksburg.
1863. January 1. Proclamation of Emancipation issued by the President.
1863. March 3. National Academy of Science created by act of Congress.
1863. May 2. Battle of Chancellorsville.
1863. June 19. West Virginia admitted to the Union.
1863. July 1–3. Battle of Gettysburg.
1863. July 4. Vicksburg surrendered to General Grant.
1863. July 8. Port Hudson surrendered, and the Mississippi River opened to its mouth.
1863. July 13–17. The draft riots occurred in New York city.
1863. September 19. Battle of Chickamauga.
1863. November 24, 25. Battle of Chattanooga.
1864. May 5–12. Battles in the Wilderness.
1864. June 19. Naval fight between the Alabama and the Kearsarge.
1864. July 11. The value of a gold dollar in New York city quoted at $2.85.
1864. August 5. Battle of Mobile Bay, with capture of forts by Admiral Farragut.
1864. September 1. Atlanta surrendered to General Sherman.
1864. October 19. Battle of Cedar Creek.
1864. October 31. Nevada admitted to the Union.
1864. November 15. The Columbia College School of Mines organized in New York city.
1864. November 16. General Sherman began his march from Atlanta to the sea.
1864. December 21. Savannah occupied by General Sherman.
1865. January 15. Fort Fisher taken by General Terry.
1865. February. The Massachusetts Institute of Technology in Boston organized.
1865. February 18. Charleston occupied by General Sherman.
1865. April 1. Battle of Five Forks.
1865. April 2. Richmond occupied by Union troops.
1865. April 9. The Army of Northern Virginia surrendered by General Lee to General Grant.
1865. April 14. President Lincoln assassinated in Washington City.
1865. April 15. Vice-President Andrew Johnson succeeded to the Presidency.
1865. April 26. General Johnston's army surrendered to General Sherman.
1866. April 2. Proclamation by the President declaring the rebellion at an end.
1866. July 25. Grade of General created in the United States Army for General Grant.
1866. July 25. Grade of Admiral created in the United States Navy for Admiral Farragut.
1866. July 27. The second Atlantic cable completed.
1867. March 1. Nebraska admitted to the Union.
1867. October 9. Alaska transferred to the United States by Russia for $7,200,000.
1868. March 7. Beginning of the trial of President Johnson for impeachment.

1868. March 23. The University of California, Berkeley, created by law.
1869. February 26. The Fifteenth Amendment recommended by joint resolution of Congress.
1869. March 4. Ulysses S. Grant inaugurated President.
1869. May 10. The first transcontinental railroad completed by the junction of the Union and Central Pacific Railroads.
1870. The eighth census showed the population to be 38,558,783.
1870. First cable street-railway established in San Francisco, California, by Abner Doubleday.
1870. October 12. General Robert E. Lee died, aged sixty-three years.
1870. November. First issue of Scribner's Monthly, now Century Magazine.
1871. October 8. The business portion of Chicago, Illinois, destroyed by fire.
1872. May. First issue of The Popular Science Monthly.
1872. Discovery of the Bonanza Mines on the Comstock lode.
1872. June 15 to September 14. The Geneva Tribunal held meetings, at which $15,500,000 were awarded to the United States for Alabama claims.
1873. July 30. Michigan State Board of Health created.
1874. July 4. Great steel bridge built by James B. Eads across the Mississippi at St. Louis, Missouri, opened.
1875. February 9. The Hoosac Tunnel, Massachusetts, completed, then the longest in the United States and the second longest in the world.
1875. March 15. John McCloskey appointed the first Cardinal in the United States.
1876. The Johns Hopkins University organized in Baltimore, Maryland.
1876. May 10. Centennial World's Fair opened in Philadelphia by President Grant.
1876. August 1. Colorado admitted to the Union.
1877. Society of American Artists organized in New York city.
1877. March 5. Rutherford B. Hayes inaugurated President.
1877. March 15. The telephone exhibited by A. Graham Bell, and its trial between Boston, Massachusetts, and Salem, Massachusetts.
1877. July 1–26. Railroad strikes prevail, with great destruction of property, at Pittsburg, Pennsylvania, and other railroad centers.
1877. August 11. Discovery of moons of Mars by Asaph Hall.
1878. The Chautauqua Literary and Scientific Circle organized by John H. Vincent.
1878. October. The discovery of subdividing the electric current announced by Thomas A. Edison, thereby making incandescent lighting possible.
1879. January 1. Specie payments resumed by the United States Government.
1879. March 3. National Board of Health created by act of Congress.
1879. March 3. The United States Geological Survey created.
1880. The tenth census showed the population to be 50,155,783.
1881. March 4. James A. Garfield inaugurated President.
1881. July 2. President Garfield assassinated in Washington City.
1881. September 20. Vice-President Chester A. Arthur succeeded to the Presidency.
1881. The Architectural League of New York organized.
1883. January 16. The National Civil Service Commission created by act of Congress.
1883. May 24. The East River Suspension Bridge, the longest in the world, opened.

1885. February 22. The Washington Monument dedicated in Washington City.
1885. March 4. Grover Cleveland inaugurated President.
1885. July 23. General Grant died in Mount MacGregor, New York, aged sixty-three.
1889. February 11. Department of Agriculture created, with Norman J. Coleman as first Secretary.
1889. March 4. Benjamin Harrison inaugurated President.
1889. June 14. New York State Naval Militia created by act of Legislature.
1889. November 1. North Dakota admitted to the Union.
1889. November 2. South Dakota admitted to the Union.
1889. November 8. Montana admitted to the Union.
1889. November 11. Washington admitted to the Union.
1890. The eleventh census showed the population to be 62,662,250.
1890. July 3. Idaho admitted to the Union.
1890. July 11. Wyoming admitted to the Union.
1891. The Leland Stanford Junior University organized in Palo Alto, California.
1892. October 1. The University of Chicago organized.
1893. March 4. Grover Cleveland inaugurated President.
1893. May 1. The Columbian World's Fair opened in Chicago, Illinois.
1893. August 7. Congress met in special session to consider the repeal of the Silver Purchasing Act.

THE UNITED STATES OF AMERICA.

CHAPTER I.

OUR CONTINENT AND THE REASONS FOR ITS FITNESS TO BE THE HOME OF A GREAT PEOPLE.

ALTHOUGH the principal object of this work is to set before the reader the existing conditions of the United States, it will be necessary for us at the outset to consider the general physical characteristics of this great land in which our people have wrought their history. Whatever be the nature or capacities of a people, however fortunate they may have been in the inheritances from their forefathers in other countries, their fate is in a great measure determined by the nature of the fields in which they come finally to dwell. We all recognize more or less clearly how our individual lives are shaped, how all our activities are ordered by the circumstances of the soil, climate, or under-earth resources of the region in which our lot is cast; success or failure may be determined by those features of our environment. That which is true of the individual is true also of peoples or states. Thus the Northmen who settled in France in their time grew to be the most powerful folk of northern Europe; they became the conquerors of Britain and the rulers of other lands. Their kindred from the same Scandinavian country, who in the same period found their way to Iceland, have been hindered in their development by the stern climate and the sterile soil of their arctic dwelling place. Though the energy and talents of the Icelanders have enabled them to survive the trials of their position, they have a scanty population, and are without influence in the affairs of the outer world. From these and other instances which are evident in every stage in the history of men it is clear that, while no peculiarities of soil, climate, or earth resources can of themselves make a people great, these conditions have much to do

with their success, their happiness, and the part they have to play in the affairs of mankind.

As our aim is to take account of the present condition and prospects of our people in this country, it scarcely needs any arguments which will not be already in the mind of every well-informed person to show that it is necessary for us to give a good measure of attention to the realm in which we dwell. To secure a clear view of the past, present, and future of our people, we must see in what ways they have been helped or hindered by the gifts of good and evil which their dwelling place affords without this knowledge we can not hope to gain a clear idea of the struggles through which they have passed on the way to the prosperity which they now enjoy, or of the successes which are before them. Therefore in these first chapters, which treat mainly of the natural advantages and disabilities of this country, we must ask the reader to keep in mind a conception of the importance of this knowledge which we shall seek to gain concerning the resources of the continent. The picture which we have to present is fortunately not only important from the point of view of the end which we have in mind, but has in itself a great charm; it is in effect a review of a great land. In presenting the matter it will be well first to sketch the geographic conditions of North America, considering mainly those features which determine its fitness for the occupation of the race to which the European peoples who now mainly possess it belong.

The continent of North America is one of the group of great lands which are so placed that their widest parts lie about the north polar regions. These circumpolar continents are commonly reckoned as three in number, Asia, Europe, and North America; but as the division between those which form the Old World is purely arbitrary, Europe being in fact the western fringe of Asia, we may fairly count the Old World as one great territory, and look upon these northern lands as but two in number. As will be seen by the accompanying map of the region about the north pole, which shows the general shape and relation of these masses, these continents are near together at the arctic circle, but, owing to their southward-pointing triangular form, they depart from each other as they approach the equator, so that they are separated by very wide stretches of sea. As we shall hereafter have occasion to note this feature of nearness in the northern and remoteness in their southern parts, we will here remark its existence in only a general way.

The Pacific shores of these northern continents converge until

at Bering's Strait they almost touch each other, there being only about sixty miles of shallow sea intervening between the nearest points of Asia and America along the boundaries of that strait. On this part of the adjacent shores a swift steamer could

Circumpolar regions.

make the passage from either land in a few hours; and even a savage in his canoe might at certain seasons safely undertake the voyage. South of this strait lies the long curved line of the Aleutian Archipelago, where the numerous volcanic islands are set like stepping stones extending from the coast of America to near that of Asia, so that a vessel sailing along the curve described by this belt of isles would rarely be out of sight of some bit of land during its voyage from one main shore to the other.

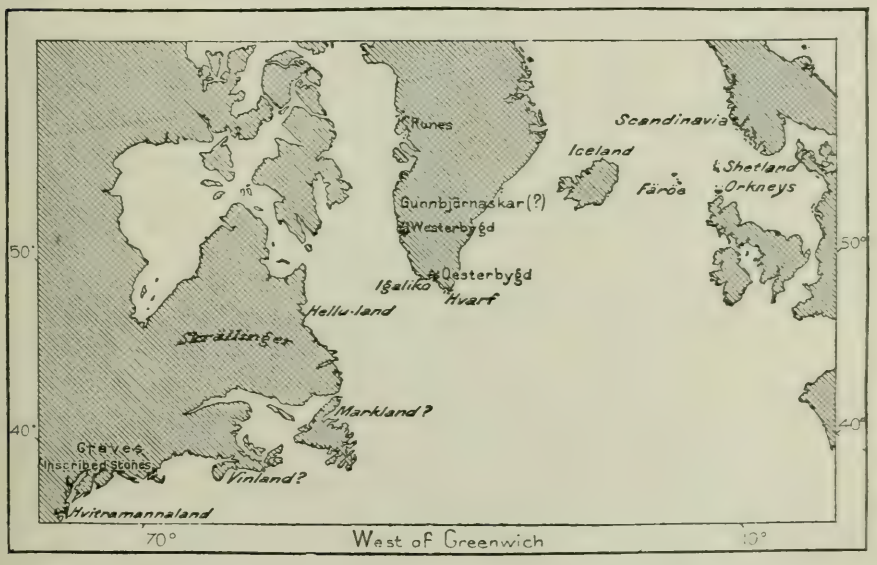
In the region about the North Atlantic the Old and the New Worlds are more distinctly divided from each other than they are along the shores of the Pacific Ocean. From the nearest main-

land of America across the North Atlantic to the shores of Europe the distance is about twenty-five hundred miles; but a vessel may sail from Labrador to Greenland, and thence to Iceland, and from there by way of the British archipelagoes, crossing no landless portion of the sea having a width of over five hundred miles. Our swifter modern steamships, if they followed this route from the shore of one continent to the other, would not need to be more than twelve hours out of the sight of land. On the other

Continental hemisphere.

hand, when we go southward to the middle latitudes, in the parallel of forty degrees, it is about six thousand miles across the Pacific and about three thousand miles from shore to shore of the Atlantic Ocean. Thus, while the Old and New World lands are tolerably near neighbors in their circumpolar parts, they are widely separated from each other throughout the greater portion of their shore line. Owing to the fact that their juxtaposed parts

are in the high and sterile north, where the lands are made desolate by the extreme cold, these continents, at least to civilized man, are much more completely parted from each other than their geography indicates. This fact is made the more evident when we consider how hard it was for the Northmen, though they were vigorous seafarers, to find their way to the fertile portions of the continent of North America. As early as 870 these daring and skillful seamen had won their way over the North Atlantic and taken possession of Iceland. In another century they pushed on to Greenland and founded numerous settlements on the inhospitable shores of that arctic land. It seems likely that Leif, the son of Eric, the most enterprising of these navigators, found his way down the North American shore as far as Newfoundland, or possibly to Nova Scotia, but so formidable were the conditions of the journey that even the inspiring reports of his voyage never



Scale 1 : 60,000,000. 1,200 miles.

Discoveries of the Norsemen in the New World.

led others of his countrymen to follow his path.* That the Scandinavian sailors, with all their daring and their knowledge of maritime affairs, did not win their way to the fertile portions of

* This sketch-map shows the utmost limits of the explorations made by the Norsemen in North America. It is improbable, however, that their voyages ever extended to the south and west of Nova Scotia, called Vinland on the map.

the Atlantic coast, is sufficient to show how very difficult is the passage between the continents in the part of the Atlantic where the shores of the neighboring continents most closely approach each other.

The reader is doubtless aware that some students of the Scandinavian sagas are of the opinion that the enterprising explorer Leif journeyed as far south as the southern coast of New England, but the weight of evidence is to the effect that even the boldest of these valiant seafarers of the Northmen people failed to attain the hospitable portion of the continent, and that its really fertile lands were, on account of the perils of a northern voyage, shut off from the people who for six hundred years before the time of Columbus dwelt along its northern shores.

For a like reason—viz., the severity of the climate—the northern Pacific lands also fail to provide an easy way for the people of Asia to enter the New World. At first sight it would seem that the people of China and Japan, who, though by no means such sailors as the Scandinavians, were not without skill in the use of ships, would have voyaged along the shores and across from one island to another until they had won their way to the fertile portions of the Pacific coast of this continent; but they failed to do so, or at least did not make any permanent settlement in this country for many centuries before the coming of the Europeans to the land. The truth is, that while it might be easy to make a coasting voyage from China or Japan to the shore about Oregon or California, the sterile coast which would have to be traversed between Kamtchatka and the mouth of Frazer River—a distance, as a coaster would sail, of about five thousand miles—would deter even the hardiest navigators in primitive ships, and turn them back toward their mother country. In fact, the scanty food-carrying power of the ancient ships, whether of Europe or Asia, made it almost impossible for an expedition to pass from the Old World to the New by coasting along the arctic shores, and thus to attain the fertile land of America in a condition to meet the dangers which newcomers have to face in an unknown land.

The evidence goes to show that for thousands of years before Columbus came to America there had been no exchange of population between the Old World and the New. A few Aleut Indians may from time to time have journeyed across the waters of Bering's Strait, and now and then a derelict ship from China or Japan may have been carried by the winds or sea currents to

Columbus Monument, New York.

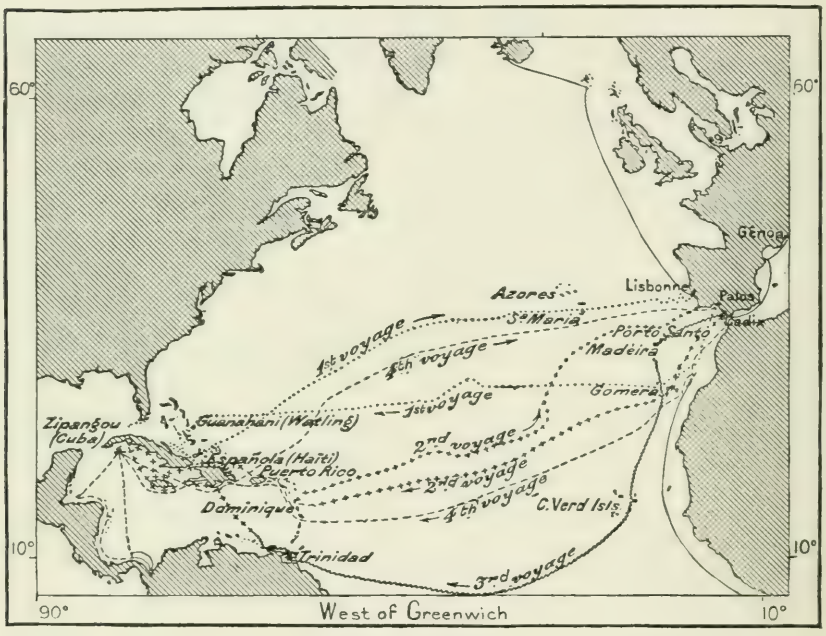
the shores of Alaska, but such chances were of little more importance in transplanting men than the floating of driftwood from the tropics to circumpolar lands is in changing the vegetation. Notwithstanding the propinquity of the boreal portions of the Old and New Worlds, it in the end proved easier for men to pass over the wider but less dangerous seas of the middle latitudes than to journey by the northern ways.

In the ancient days, before the last Glacial period, perhaps before America was occupied by men, when the climate of the high north was far milder than it is now, there was doubtless a better chance for the intermingling of the animals and plants of the Old and New Worlds by these northern paths; but in the period of human history these ways have been closed by the rigor of the climate which infolds them in almost continuous winter. Notwithstanding the nearness of these lands to each other in their arctic regions, they are really parted by the space of wide oceans, and the barrier has long been so effective that Europeans and Asiatics voyaged for centuries before they found their way to the shores of America. But for the genius and determination of Columbus, it might have been yet another century before explorers discovered this continent. If his voyage had proved unsuccessful, or if, after the discovery of the West Indies, his expedition had been wrecked, it might have been as fruitless of subsequent enterprises as that of Leif Ericson.

We have first of all noted the position of America with reference to the Old World for the reason that this is a point of view that much interests us; we are descendants of people from Europe, and the presence of our race on this continent is due to the accidents of its position. We must now take a more extended view of the position and relation of the continent with reference not only to the conditions which determined the coming of Europeans into its lands, but also as to its place among the continents.

North America is, in its general form, what we may term a normal continent. In shape it is somewhat rudely triangular, with the base of the figure toward the north and within the arctic circle. From this base it extends southward, gradually narrowing until the apex lies near the equator. At this southern extremity it terminates in an irregular strip of land, the Isthmus of Darien, by which the northern continent is united with South America. In its general shape, with its wide northern part and southward narrowing form, North America closely resembles the

other continental areas. The great land mass of Europe-Asia is not very definitely triangular, but a distinct indication of this figure may be seen if we draw a line from the southern part of Spain to the southern extremity of Hindoostan, and another down the western shore of Asia. It will then appear that the area of the Old World continent has a general likeness as regards its form to our own, the difference being that the triangle of the



Scale 1 : 90,000,000. 1,800 miles.

Voyages of Columbus.

Old World is broader based than that of the New, and also has a much more irregular shore line.

The other continental masses are, as regards their form, much more nearly like our own land than is the Old World. Africa and South America curiously resemble North America in their general outlines; they also have the three-sided form; their bases are toward the north and their longer sides converge toward the southern pole. The continent of Australia appears at first sight to be an exception to this general principle, that the great lands point southwardly and terminate in the manner we have described, but this exception is only apparent, and is due to the

fact that Australia has not yet achieved the normal continental growth, much of its area not yet having attained the surface of the ocean in which it lies. As we shall hereafter have occasion to note in tracing the development of North America, the usual process of continental increase appears to lead to the construction of its northern parts before the southern portion of the elevation is brought above the level of the sea.

There can be no doubt that the general features of continental form which we have noted above are due to some modes of action of the earth's forces which operate over all parts of the surface. To see how striking is the result, the reader should note the appearance of the continents either on a globe or on a world map, where the surface is drawn in the form of two hemispheres which show the relation of the several parts to each other, and not on a Mercator's projection, such as is commonly used in our schools, where the proportions of the lands in the regions about the poles are greatly exaggerated. The best plan of all for the student is to frame a clear mental picture as to the general form of the earth through the memory of its aspect as presented on a globe. He should be able to represent it in his mind's eye much as he might behold it if he stood upon the surface of the moon. In such a far view we may be certain that the southward pointing of the continents would appear as a singular and beautiful feature in the aspect of our planet. If there be intelligences in the stellar spheres to whom it is given to behold the geography of the earth, we may be sure that these uniformities in the order of its lands would be to them a matter of exceeding interest.

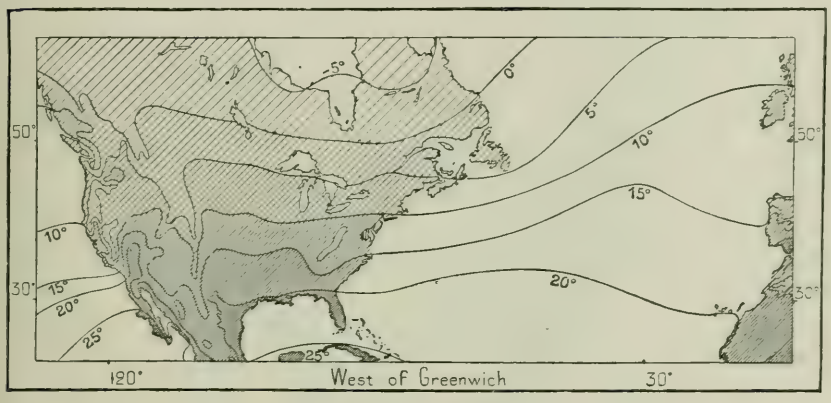
One of the many important, and in a way practical, results of the distribution of the continents is that the larger part of the surface of each is exposed to a particular belt of climates, and so the atmospheric condition of each one has a general uniformity in character. Thus, the continents of the northern hemisphere—Europe-Asia and North America—have the greater part of their areas in high latitudes, and so the most of their lands have cool or cold climates, and a relatively small part of each lies within the tropic realm. We may fairly term them the winter continents, and their life of all grades—that of plants, the lower animals, and of man—is generally adjusted to the peculiar needs which frost brings to them. These winter lands are the region of strenuous conditions, which demand strength and energy from their dwellers, which give much to the able-bodied, but are unfit for weakly creatures.

The southern group of continents—Africa, South America, and Australia—have their widest parts beneath or near the equator, which causes the greater portion of their land to be of exceeding warmth, and only a small part of them to have the conditions which are found in the northern continents. They are tropical countries, over three fourths of their surfaces having the temperature which permits of the growth of the more delicate palms, and generally of plants which do not endure the touch of frost. Probably not one tenth of their aboriginal peoples have ever seen snow or ice. In North America, on the other hand, nineteen twentieths of its surface experiences a freezing temperature, and snow is a familiar spectacle to at least four fifths of its population.

Fortunately for us, North America falls into the group of frosty continents, for in them alone does the life of man find a fit condition for its highest development either in body or mind. In this need of cold for his best estate man differs from the rest of the animal kingdom. His very remote cousins the monkeys—which are not, as they are sometimes believed to be, his ancestors, but in fact his collateral kindred—are all strictly limited to the summer lands, and quickly perish in frigid countries unless they are strictly guarded from the influence of the cold. The greater part of the higher mammalia likewise shun high latitudes, and only attain their perfection of growth in the warm regions. Of man alone can it be said that he is at his best in the boreal climates. The Aryan race, which is by far the most vigorous of all the varieties of man, attained its qualities in that part of Europe which lies about the Baltic Sea, where the winters are severe, and life is a constant struggle with the long-enduring cold which winter brings. In such conditions, as long as food and fuel is abundant the human body attains its greatest vigor, size, and longevity, and the mental powers are at their best; thence southward it may retain these qualities as long as the winter season brings a moderate degree of frost. When we pass into the tropics, though the frame may with certain races exhibit a moderate development, it can not endure hardships as well as where it is bred in contact with an earth which is often snow-clad, and the mental powers appear always to be enfeebled.

While from the point of view of human interests it must be deemed fortunate that our continent is so placed that it lies mainly in high latitudes, its position brings with it certain grave disadvantages. A large part of its area is exposed to a climate so rigorous as to make it unfit for the uses of civilized man, for it is

placed so near the pole as to prevent the important food-producing plants from ripening. In this manner a portion of the area of the Canadian Dominion is in the present condition of the world's climates as unfit for the use of the civilized races as is the region of the Sahara. Although the climate of this northern portion of North America is unsuited to the plants which the race needs, it is otherwise not unfit to be the abode of our people, for experience shows that men of our race may dwell for centuries in Iceland or southern Greenland. It is only because this northern district can not be used for agriculture that it is unsuited for civilization. On this account we must exclude from our estimate of the area of the continent which is valuable to the descendants of



Scale 1 : 106,000,000. 2,480 miles.

Isothermals of the United States.

Europeans all that part of the land which can not be made to rear the crops, particularly those of grain, which constitute the foundation of our race life. This grainless area includes nearly all of the country which lies to the north of a line extending from southeastern Labrador in a northwesterly direction to near the head of Lake Superior; thence northwardly to the southern end of Lake Athabasca; thence again southwesterly to the mouth of the Frazer River on the Pacific coast. Thus about one fourth of the area of the continent may be regarded as beyond the limits of human enterprise, at least as far as agriculture is concerned. This excluded portion, though essentially useless from the point of view of agriculture, abounds in mineral resources, and will in time doubtless be more or less occupied by men who seek these subterranean stores.

Perhaps the noblest use to which the Canadian people could devote this northern realm would be to retain it as a wilderness, a vast continental park, where, in the manner of the state preserves or forests of Europe, or the nobler preservations of the Yellowstone and Yosemite, the earth may be left to Nature, or at most the artifices of man shall be limited to the construction of ways which may give access to its beauties without marring its primitive aspect. This region bids fair to remain in the time to come the only extensive field of a charming aspect which will be exempt from human use. We may look forward to the permanence of its wild state with greater satisfaction, for its climate, though inhospitable, is in summer delightful. It has, moreover, a marvelously diversified surface, abounding in lakes, streams, and hills, and in its western parts, within the limits of the Cordilleran Mountains, the scenery has a dignity which may be compared with that of the Swiss Alps. In summer this region is the resort of many species of our American water fowl, which breed in its recesses, and a number of our noblest American mammals prosper in its fields. The moose, the caribou or American reindeer, the musk ox, and a smaller variety of the nearly extinct American bison, are fitted to its climate. Along the northern part of its shores polar bears abound, while the black species occupies a large part of the area, and the grizzly bear exists in the western portion of the field. The fur-bearing animals are found in great plenty in nearly all parts of this high northern realm, and the traffic in their skins will always maintain a certain commerce between its Indian tribes and the civilized world. The fresh waters abound in fish, which, though they belong to species which have no great value as the basis of industry, are well suited to the sportsman's use. Along the shores of this boreal land the marine fishes swarm, and each year these coasts become the seat of more extended fishing industries.

Not only will this region remain a wilderness, unsought as the dwelling place of civilized man, but it is likely that it will become the seat and stronghold of the native Indians, who there may find a refuge from the debasement and final extinction which menaces them in all parts of the continent which are suited for the uses of our race. The American Indian is fitted to just such a life as this region affords to savages—a life as a hunter and fisherman, with its seasons of intense activity and times of prolonged repose. Here he may be separated from the vices of civilization, and may long remain in his pristine state, the noblest animal of

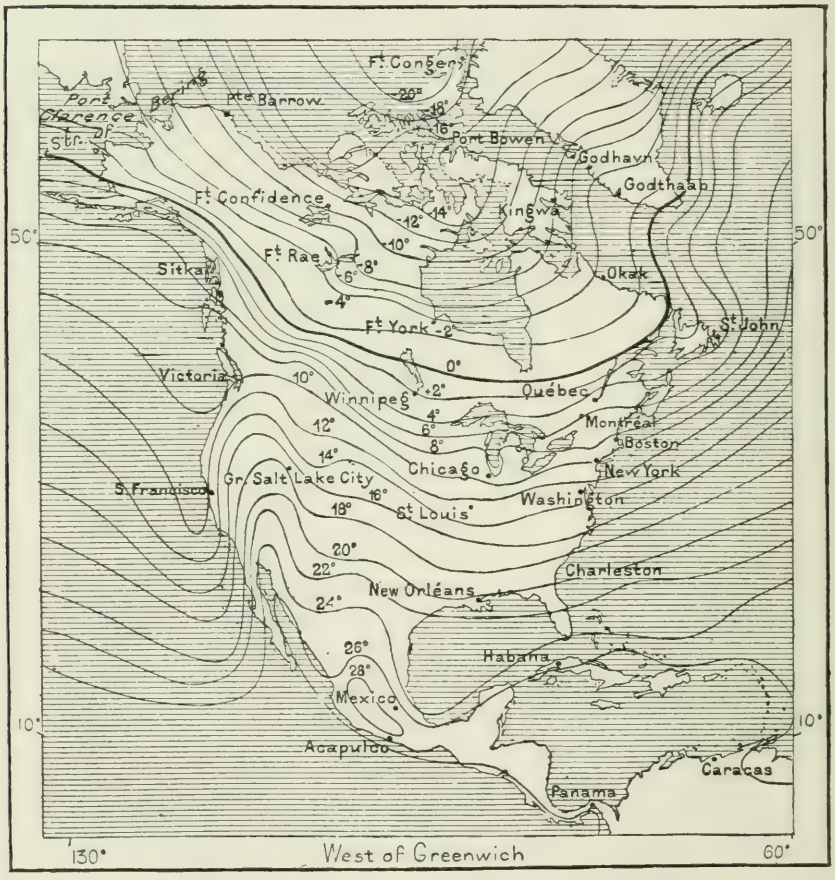
North American elk.

this vast preserve. It will require no such system of police as that which now with difficulty excludes the vagrant element of our people from our national parks to preserve this circumpolar part of the continent from debasement. This climate, by debarring its inhabitants from agriculture, has sealed it to the people of Canada and the United States as a place of recreation.

The line of demarcation between the sterile and the tillable portion of North America is very sharply drawn. At many points —as, for instance, along the Gulf and River of St. Lawrence— the division between the two districts may be found in a belt of country not fifty miles wide, to the north of which no profitable agriculture is possible; while to the south the soil repays the labors of the husbandman in a satisfactory manner. In the main valley of the continent, near the Cordilleras, the country which is suited to agriculture makes a broad and deep bend to the northward, extending to Athabasca Lake, and occupying the great valley of the Saskatchewan to the foot of the Rocky Mountains. It may, indeed, be found that certain of the hardier grains—oats, wheat, and rye, and perhaps buckwheat and barley—may, by a proper selection of varieties, be made to yield subsistence for man and his domesticated animals up to near the borders of Great Slave Lake. The reason for this peculiar bay of good climate extending so far to the north in this central section of the continent is mainly to be found in the effect of the western mountains on the temperature of the air which flows in from the Pacific Ocean. Owing to the fact that these eastward-setting winds descend from a great height upon the plains of the central district, they are warmed through the process of condensation which the air undergoes, and are so made better fitted to maintain life. The nature of this remarkable action will be discussed in the general account of the weather of the continent. It is for the present sufficient for us to notice the fact that, owing to a simple law of atmospheric temperature, this region of some two hundred thousand square miles is redeemed from what otherwise would be complete sterility.

The direction in which this line which divides the sterile from the fruitful districts of North America crosses the continent admirably illustrates the influence of sea and mountain in determining the climate of a great land. On the Atlantic coast the southern limit of the tillable belt is turned to the north as far as southern Newfoundland by the effect of the sea in mitigating the rigors of the frost. This influence is relatively small along this

part of the continental shore, because the waters next the coast line are cooled by a current setting southward next the margin of the land from the area of Baffin's Bay. In the interior district, north of the Great Lakes, the border of the sterile field is deflected southward because of the height of the land. The northward bend of the valley of the Red and other rivers of the central district is, as we have noted, mainly due to the curious effect of the western mountains on the wind which blows over that surface.



Scale 1 : 80,000,000. ——— 1,200 miles.

Isothermals of North America.

The sharp and long deflection of the tillable belt to the northward on the western coast of America, which carries the field of possible agriculture about one thousand miles nearer to the pole

than on the Atlantic, is due to the warmth of the waters on this shore, which receive the tide of the great Japan current, a stream essentially like our own Gulf Stream in its position and effects on the oceanic temperatures.

South of the sterile field of the Canadian Dominion the continent of North America, except in the higher mountains, has a summer temperature suited to agriculture—not over one hundredth part of the area is in this regard unfit for the uses of the farmer. It must not, however, be supposed that the whole of this vast field is fit for tillage. Unfortunately the lack of moisture which prevails in many places is as sterilizing in its effects as is the lack of heat, and thus a large part of the warm section of the continent—probably one third of its surface—lacks the rainfall which is necessary for husbandry. This arid or scantily watered region lies altogether in the central or westerly portions of the continent, where it extends from near the Canada line, at which point it is about a thousand miles in width, nearly as far south as the city of Mexico, where, owing to the narrowing of the continent, it is only three or four hundred miles across. Although this arid district is a tolerably well-defined field, it shades off in a somewhat gradual manner on either side into the sufficiently though still scantily watered lands. Thus, on the east we find that the parts of North and South Dakota, Nebraska, Kansas, and Texas which lie nearest to the Rocky Mountains are on the verge of or within the arid field. In certain seasons they so lack for rain that their crops are blasted; again, for a term of years the field of sufficient precipitation swings to the westward, and their wonderfully fertile soils have a chance to yield their willing harvests. There is in this part of the continent a fringe of debatable land having a width of about two hundred miles, where the variation of the seasons now gives plenty, and again reduces the land to an unfruitful state.

On the western or Pacific side of the arid region we find a sharper line between the desert and the fertile places. This distinct demarcation is due to the fact that the limit between the arid and well-watered condition is there set by the position of the mountain elevations which face the Pacific Ocean, and by the character of the winds which blow in from that sea. In this part of the world the soil tiller can generally reckon on what he may expect from the sky with a measure of certainty which is unattainable in the central or eastern portions of the continent, where the winds are more variable and the climatal equations which

determine rain are far more complicated and inconstant than they are along the Pacific coast, where one sea and one set of air currents control the climate.

The central arid field of North America is in its extent the fourth of the desert lands of the world; it is surpassed in the order in which they are named by those of northern Africa, central Asia, and western Australia. Of all the great deserts of the world it is the least completely sterilized by its lack of moisture. As the conditions of this scantily watered part of the continent are of the utmost importance to the future of our people, the student will do well to compare its state with that of the deserts of the other great lands, so that he may see how far it is likely to afford a field for the extension of our growing population and of our developing arts. Such an examination is the more imperative for the reason that the completely sterile districts have ever presented the most insuperable barriers to civilization. Thus the civilization of Asia has surrounded but not conquered the great area of its central desert, and the culture of Egypt has for five thousand years remained fenced within narrow limits by the waterless sands of Africa. The desert of Australia is as yet hardly touched by civilization, but it seems to constitute a great wilderness which can never be subjugated by the singularly enterprising people who have occupied its southern and eastern boundary.

The American desert of our older geographies was pictured as a most inhospitable realm, fit to be compared in sterility with the arid wildernesses of Asia and Africa. In part, the impression it made upon the early explorers was due to the fact that they went forth into its fields from the densely forested and superabundantly watered district of the eastern part of the continent, where the rainfall is much greater than is necessary to maintain agriculture; where the earth brings forth its fruit in a measure almost unknown in any region beyond the tropics. These pioneers were accustomed to a soil which was fairly sodden with water. If they had gone into the Cordillera region from such a country as India they would hardly have been inclined to call much of it a desert. They would have seen that, while scantily watered, a very large part of its surface could be made useful for pasturage; and that much of it, by simple artifices in the management of its streams, could be made to yield noble harvests. In a word, the name of desert, which was applied to this district, is to a great extent a misnomer: it might better be termed "the arid

region," or, better still, "the country of scanty rain." To our early people the absence of the familiar forest coating, which had existed on all the lands they had hitherto explored, seemed to indicate hopeless sterility in this field. Even the first settlers of Kentucky called the admirable soil of the Green River district "The Barrens," because they were in the state of open prairie; it was only after a time that they deemed them worthy of occupation.

In North America the lands of scanty rainfall occupy in general the area from the one hundredth meridian west to the Coast ranges of the Pacific. In the southern section of the United States, and in northern Mexico, the arid district comes to the very shore. Within the limits of Mexico, and north of the city of that name, the larger part of the area, except a strip next the shore on the east and west, is of a rather arid nature, and much of it is completely sterilized by drought. Over the most of this great area, where the land is high, the dryness is in its measure extremely variable, the rainfall over large districts being sufficient to secure the growth of tolerably well-developed forests. In the southern section the aridity is greater, and in Arizona and parts of New Mexico, and a large portion of the northern section of old Mexico, there is, save where the soil is artificially irrigated, no economic return except a scanty pasturage. In general we may say that south of the States which border on the Canadian line in the Cordillera district no true agriculture is possible save by the use of engineering devices for bringing water upon the land.

The aridity of these countries, however, is not due to just the same cause as that which sterilizes the deserts of Central Asia or of the Sahara. In those countries there is an exceedingly small amount of rainfall, while over the larger part of the Cordilleran district the amount of precipitation is sufficient, if it were well distributed, to make some form of tillage possible. The difficulty is that the deposition takes place in the winter season, and to a certain extent is irregular, falling mainly on the higher mountain peaks in the form of snow. The fact that this region does not lack for water in a measure to reduce it to its sterile condition is indicated by the numerous rivers of considerable volume which are mainly fed from the snow which falls in the cold season. In the Sahara and various other true deserts there are no such streams. A considerable portion of the surface of this region, probably between fifty and one hundred thousand square miles, can be won to tillage and made to bear exceedingly abundant

crops by a system of appropriate reservoirs and irrigation ditches. A few years ago the Federal Government wisely undertook a systematic survey of this arid district with reference to its irrigation system. Though only a small part of the country has as yet been surveyed, the results obtained on several distinct fields show that the proper execution of an irrigation system such as has been instituted in British India would win to the use of agriculture a vast body of very fertile land. A further consideration of the irrigation problem will be presented in the chapter on the Soils and Agriculture of this Country.

From the one hundredth meridian east to the Atlantic the rainfall is in general sufficient to maintain the soil in a condition to yield profitable harvests. Over the most of this region the annual precipitation is on the average much greater than that which falls in those parts of Europe which have the greatest fertility, and the distribution of the rain as regards the seasons is generally favorable to the needs of the husbandman. The summers are rather drier than are those of Europe, and the winters are characterized by more intense cold. Although droughts occasionally damage particular sections of this great field, as they do the greater part of the Old World, it has never happened since this country was occupied by Europeans that the lack of rain has endangered our national prosperity. The scanty rainfall in any one district has usually been balanced by an abundant precipitation in other parts of the country, so that the average return from the soil has in general been more uniform than in any of the states of the Old World. In a similar manner the excesses of rainfall, where they occur in a measure to be damaging to agriculture, have in general been of a local nature, affecting even less extensive fields than the droughts. It may, indeed, safely be said that the eastern half of this continent is by its natural condition insured from any widespread climatal accidents of a serious nature, such as are likely to bring distress upon the whole country.

The advantages arising from this well-balanced climate of the great tillable district of North America are very great. They insure to this section of the continent, and especially to the United States, a practical immunity from the serious dangers arising from a general failure of the crops upon which the subsistence of the people depends, as well as of those products, such as cotton and other exportable materials, which do not serve as food, but which are of so much value in commerce. The experience of over two centuries on the eastern border of the continent, and of

about a hundred years in certain parts of the Mississippi Valley, serves to indicate that anything like a famine or even a serious dearth of soil products is not to be apprehended in this land. In most European countries, because of the less extensive areas and more imperfectly balanced climate, the soils are subject to sudden and very great alterations in the rainfall, which seriously diminish the returns from their fields. Thus, in Great Britain the farmers and the landholders during the last decade were to a great extent impoverished by the occurrence in a number of successive years of excessive summer rains. In this manner the agricultural interests of a country receives a shock so serious that it requires many prosperous seasons to accomplish a recovery. Although this uniform fruitfulness of our American fields is in this time of our prosperity a matter of great moment, it was of vastly greater importance in the earlier stages of our commercial history, before the accumulation of capital and the diversification of our industries was accomplished. At any time during the colonial period of our history a decade of sterile years would have been an almost insuperable misfortune to the land.

Another peculiar advantage arising from the wide range of climate in the eastern half of North America is found in the manifold variety of the crops which it insures. This interesting feature will be more extensively considered in the chapter on Agriculture; but it is important for our general view of the conditions which determined the habitability of this land to notice that the variety of soil products which are yielded by our fields in quantities sufficient to give them a value in the economies of the world are in North America greater than in any other equally extensive land, and far exceed those contributed from any one European country. Thus Russia, the only Old World land which in tillage area can be compared with the United States, has only a few important agricultural exports, namely, grain, flax, and hemp. Great Britain no longer contributes much in the way of soil products to the commerce of the world. France and Germany yield beet sugar and silk, and Italy, along with France, both silk and wine. Spain, France, and Italy produce olive oil; British India exports, as does China, tea and some fibers, but no other articles of leading importance. On the other hand, from the United States is shipped the greater part of the cotton,* tobacco, and grain which enter

* In 1889 there were 5,942,788 bales of cotton produced on 16,068,696 acres of land in North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Louisiana, and Arkansas.

into international commerce. Its dairy products exceed those of any other country, as do also its shipments of meats. From its forests are sent forth larger amounts of timber than are afforded by any other country.

We must also note in advance of the detailed consideration of the matter, in the chapter on Mineral Resources, that the stores of subterranean wealth in this country are such as to make it particularly fit for the needs of civilized man. There are two substances which in the present state of human culture form the common basis of all our more important commercial activities; these are coal and iron. With these materials in sufficient quantity and of suitable quality, the material bases of a civilization which is founded on a fertile soil is made secure. These two substances exist in the central portions of the continent in greater abundance than in any other part of the world which is known to us. Unless it be in China, where it is evident that there is something like the same abundance of these earth resources, North America is clearly more amply provided with them than any other great land.*

The somewhat less important subterranean stores, such as copper, lead, zinc, manganese, iron pyrite, fertilizing minerals, and building stone, also abound in this part of the world. The precious and the other rarer metals, except tin, all exist upon this continent. This last-named metal, though existing in conditions which make it the basis of profitable mining in the other great lands, for various reasons seems to be of little economic value in this country. It is doubtful if it occurs within the limits of North America in sufficient amount and in such condition as to repay working at the price of American labor. Although this metal is of great economic value, it is less indispensable than either coal, iron, or copper, and its relatively high price makes it easy to transport it from other parts of the world in such quantities as are required by our needs. It is safe to say that no single state of Europe is so well provided with the sources of energy such as are afforded by coal,† or with the

* It is estimated by Day, in the Mineral Resources of the United States, that the total value of all the mineral substances produced in the United States for 1887 was $542,284,225. Of this sum, $250,419,883 came from metals, $285,864,942 from nonmetallic substances, and $6,000,000 represents the estimated value of unspecified mineral products.

† In 1887 the United States held the second rank as a coal-producing country, the output being 116,049,604 short tons, against 162,119,812 produced by Great Britain. Germany, which held the third place, produced 73,637,596 tons.

View of New York harbor, from eastern end of the Brooklyn Bridge.

grosser metals* demanded in the manufacture of all kinds of machinery, as is the field occupied by the United States.

Among the resources of a natural kind which go far to determine the fitness of a country for the uses of civilization, we must reckon as of first importance the products of the forest.† The timber required for the very numerous construction purposes, and the bark of various trees which afford the tanning necessary for dressing leather, are indispensable to people above the grade of the savages. The early European settlers of this country founded their colonies in that part of the continent which abounds in rich and varied forests. The Spaniards found in the Antilles and on the mainland a vegetation which contained a great number of trees well suited to the needs of architecture, two of which—the mahogany and the live oak—have remained to this day of great value for their strength, beauty, and durability. The people who settled in the country north of Florida found forests which in a general way resembled the European woods from which their ancestors had drawn their supply of timber; but these forests of eastern North America were very much more varied and afforded a greater range of constructional wood than those of the Old World. Thus, in place of the four species of oak which had afforded the constructional woods of greatest value in European countries, our American growth supplied from the fields which were shortly accessible to the colonists eight or ten varieties of this genus of trees. The other broad-leafed trees—such as chestnuts, beeches, walnuts, tulip trees, etc.—afforded a range of quality in the timber which far exceeded the resources of European forests. The narrow-leafed forms, such as the pines, firs, and hemlocks, plentifully existed in this section of the continent, and covered extensive areas with a finer growth than any of the transatlantic forests afforded. The woods of the Appalachian district were in all respects the finest of those found in any region beyond the tropical parts of the earth.

Although the density of the east American forests for more than a century proved a formidable obstacle to the development

* In 1887 the United States ranked second as an iron-producing country. Great Britain produced 13,098,041 tons, the United States 11,300,000 tons. Since then this country has advanced to first place.

† In 1880, according to Sargent, the total value of the forest crop of the United States, so far as it could be ascertained, was $490,073,094. Of this, $139,836,869 was the value of saw logs; more than $325,000,000 worth was used as fuel, and the remainder for miscellaneous purposes. The manufacture of uncultivated vegetable substances used in the preparation of medicines consumed $587,000 worth of material.

of its agriculture—for it required a great expenditure of labor to clear the growth away and make the land fit for tillage—the presence of these noble woods was of great advantage to the early settlers. They assured an abundant and readily obtained supply of materials for their domestic building and their ships, as well as the needed fuel for their fireplaces. Moreover, the forest products of this district at once afforded important articles of export, and they remain to this day very valuable elements in the transatlantic commerce of this country. The ships which bore the first colonists to the Atlantic coast generally returned laden with timber or with the bark of the sassafras, which in the olden time was supposed to have rare medicinal virtues.

Among the many advantages which the surface conditions of North America, particularly of its eastern part, afford to civilized man we must reckon the innumerable water powers which are available for the use of industry. In all the section from the St. Lawrence to near the Gulf States the streams which descend from the Appalachian highlands are numerous, and constant in their flow; they abound in waterfalls and rapids, and in many places exhibit the exceptional feature of cascades near the head of tide-water navigation. The forests, still abundant in this district, serve to retain the rainfall and deliver it somewhat gradually to these streams. In New England and the other parts of the country where the surface is deeply covered with a layer of open-textured drift these remnants of the Glacial period store the water of the rains, feeding it gradually to the rivers. The result is that in this part of the world good sites for water mills abound, and the people even in early colonial times became adepts in their use. The rapid development of manufacturing industries in the section between Nova Scotia and Virginia was in a great measure due to the excellence of these natural sources of power which the streams afforded.

Perhaps the most important single feature in the physical constitution of this country is found in the general wholesomeness of its area. Many of the colonies which our race has essayed to plant in lands remote from its birthplace have been brought to ruin by the prevalence in the several regions of diseases which rendered the lands unfit for occupation. Thus British India has proved an impossible country for the permanent occupation of our people. The children of European settlers are enfeebled by the climate, and so the race has never taken root in that realm. The same is the case with many other tropical countries. There

is not a single one out of the scores of settlements which have been made by the peoples of northern Europe in that part of the world where a fair measure of success has crowned the effort to establish peoples who were cradled in the high north. Where the colonists have survived in tropical countries they have in most cases won the endurance which was necessary to meet the conditions by mingling their blood with that of the aborigines, in this manner forming a mongrel folk, destitute of the characteristics which give to the pure European blood its peculiar intellectual and moral quality. Thus the Spaniards of the Caribbean district and the Portuguese of South America have become, by amalgamation with the Indians or the imported Africans, very mixed races. They have thus reconciled themselves to the climate, but they have lost much of their primitive excellence. Among the many blessings which this continent conferred upon the immigrants from northern Europe we must count this feature of a favorable climate as the foremost: the success of our race in the New World absolutely depended upon it.

Although the climate of North America in many ways differs from that of Great Britain or of Continental Europe, the likeness between the atmospheric conditions of the two lands is on the whole very great. In equal latitudes the climate of North America is more variable than that of Europe. The winters of the New World are in the region north of the Potomac, Ohio, and Missouri rivers much more strenuous than they are in the principal states of Europe, and over the greater part of its surface the summers are much hotter than they are on the other side of the Atlantic. The peculiar feature of the winter and summer seasons in this country is found in the sharp contrast of temperature which they exhibit. These alternations seem to be generally helpful to the condition of the human body, serving to maintain a degree of vital energy which does not appear to be attainable in regions where the temperature is continually high. This difference between the winter and summer temperature exists over at least nineteen twentieths of the land area of this continent. Southern Mexico, Central America, and the lowlands of the West Indian islands are the only parts of its surface where the climate does not present these marked seasonal alternations. Even the highland district of Mexico, though generally well within the tropical belt, has such an elevation above the sea that snow gathers on a large part of its mountains, and a time of cold prevails for some months. The Pacific coast of the United States has the

least of this winter quality in its climate, a feature due to the warmth of the neighboring seas and the direction of the prevailing winds. A portion of southern Florida, a belt of the shore from near Key West to the Indian River, has a really tropical climate, practically without winter, but even here occasional frosts occur, and at times thin sheets of ice are formed.

As a result of this general likeness between the climates of Europe and America, the diseases of men and of the domesticated animals which prevail on this continent are substantially the same as those which affect the people of northern Europe. This identity of the maladies in the two countries is a matter of more importance than may at first sight appear to the reader; for when men or the creatures of their flocks and herds encounter new diseases, they commonly suffer much more from the affliction than when they have been long exposed to them. By the exposure their bodies become accustomed to the action of the malady. Thus such ills as the tropical fevers, which the natives of that part of the world can fairly well withstand, are peculiarly deadly to Europeans; even if they survive the assaults of the disease they are likely to be permanently injured by the sickness, while the native-born of indigenous races are not so seriously affected. When North America was first settled from Europe there seems to have been in it the germs of no diseases which were not in their nature already familiar to Europeans, and a number of the more serious which were rife in the Old World were unknown here. The various plagues which had been so deadly in the Old World in their successive incursions from the East were not native on this continent; so, too, smallpox, scarlet fever, measles, and leprosy did not exist among the aborigines of this country. On the whole, the New World was found by the colonists to be more wholesome than the Old. The only malady which was here encountered in a more serious form than in the native country was ague or remittent fever, and perhaps some varieties of malarial disease occurring in the district about the Gulf of Mexico and known as dengue or break-bone fever. This class of maladies was, however, common in many parts of Europe, and ordinary ague was of frequent occurrence in eastern and southern England.

Our experience of the climate of North America indicates that it is as favorable to the life of man, and to that of his domesticated animals, as any other part of the world. It is true that we have brought with us from the Old World all the ancient

store of ailments which have been attendant on our civilization from immemorial times. It is also true that occasionally violent epidemics, such as cholera, yellow fever, or influenza, invade this land from beyond the sea, but these appear to be essentially foreign to our land, and except yellow fever, which, probably in the first place imported from Africa, has become naturalized in the tropics of America, they do not take permanent root here, but depend for their occasional development on the importation of germs from the Old World. As will be shown in the chapters on the present condition of the American people, the effect of the climate and other conditions of man in this country has been to add to rather than to detract from the vigor of his frame.

We have next to notice the advantage due also to the essential likeness of the climate of this country to that of the cradle land of our people, which arises from the ease with which the peculiar plants such as afford our field and garden crops can be reared in the New World. To perceive the importance of this ready adaptation of the economic plants to the conditions of this country, the reader should note the fact that all these vegetables have been slowly won by our forefathers by centuries of experiment with wild plants. They are, indeed, the ancestral treasures of our race, deserving in value to be ranked with the noblest of our inheritances. They should, indeed, have the very first place among our riches, for upon them depends our civilization. The tax put upon an immigrant people by the need of adjusting themselves to the culture and use of new plants is most serious. In the first place, the skill gained by immemorial experience in rearing particular varieties of plants and animals, is a part of their possessions which is of very great use to a folk. If they have to take up with new agricultural arts, they can acquire them but slowly. Moreover, people become accustomed to a particular kind of food, and with difficulty form the habit of using other victuals. Thus, while certain Southern plants, such as the plantain and the yam, yield very nutritious food, the native of northern Europe finds them unsuited to his inherited constitution, and is likely to be enfeebled if he is forced to depend upon them for his diet.

The only part of the settlements made by Europeans in North America, which had to adopt new tillage conditions or to rely on new articles of food, were those which were founded in the region about the Caribbean Sea and the Gulf of Mexico. At the time when our race settled America the standard crops for the subsistence of north European Aryans were the so-called small

grains, wheat, rye, oats, and barley, all of which have been in the possession of those peoples from immemorial time. There were also certain other plants mostly eaten in their green state or used as dried herbs, such as cabbages, onions, beets, carrots, and various kinds of peas and beans, together with hops, and the plants, such as sage, which were used for flavoring food. All these garden varieties of plants had been associated with our people for many centuries, and all of them were found to do as well on the greater part of North America as they did in western Europe. So, too, the less important sources of food which the commoner fruits afford have been shown by experience to develop and ripen quite as well in the New as in the Old World. Even the garden flowers, sensitive as they are to considerable climatal changes, suffered little from their transplantation to the New World, so that the early colonist in the region north of Florida found the familiar vegetable life to which he and his forefathers had looked for sustenance, or for the gratification of palate or of eye, ever beside him as companions and aids in his new dwelling-place.

After the first trials of the change were over, the New-Englander and his brethren of the colonies on the north and south, from the Gulf of Mexico to the St. Lawrence, gazed upon fields and gardens which did not greatly differ in their aspect from those of the native land beyond the sea. The advantages arising from this similarity of crop in favoring the transplantation of European life to this continent, are only to be estimated by those who have attentively considered how hard it is for a rustic people to order their habits which depend upon the culture and products of the soil. When a change in these regards is necessary, it vastly increases the difficulty of founding a colony—a task which in its simplest condition affords the greatest trials to which a people can be subjected.

Not only did North America afford a climate well suited to the ancestral crops of our race, but from its native plants it at once contributed to the industry of the people two new and most important sources of food-supply for man and his domestic animals—the Indian corn and the potato. The advantages derived from the use of Indian corn are manifold, and upon them in good part has rested the possibilities of rapid progress which we have made in the settlement and subjugation of this country. Maize, or Indian corn, has the peculiarly good feature that it is much stronger rooted than any other grain, and thus can prosper in the rude condition of the "clearing" which the farmer makes in the

forest. When the trees have been killed by fire or by cutting away a rim of the bark, and the undergrowth subdued, the seeds of the plant may be placed in the earth with little or no preceding tillage, and almost without subsequent care will produce an abundant harvest. With each improvement in its nurture this sturdy plant affords a better crop: with the expenditure in the way of labor which will give a yield of twenty-five bushels of wheat, maize commonly yields about fifty bushels of grain, and on fertile soil with careful farming it generally produces a crop having more than twice the nutritive value of the smaller grain. Indian corn is surer to yield a reasonable harvest over the greater part of the continent than any other important food-giving crop. It is easily planted, and the harvest may be gathered over a period which commonly endures for some months, while wheat and similar crops have to be garnered at a precise time. Thus, maize is characteristically the grain of the pioneer. On the frontiers of our civilization it has fed people during the time when they were winning their fields from the forest. The progress of our conquest of this continent would have been relatively slow had it not been for the good fortune which put this admirable food plant in the possession of our people.

The potato is next after Indian corn the most important contribution in the way of food plants which this country has made to the resources of the world. As it was not in use by the North American Indians, it did not come directly to the colonists of this country, but only became a tillage crop of any importance at a relatively late date; although next after the grains the most valuable element in the dietary of our people, it has never had with us so important a place as it has commanded in northern Europe.

The tobacco plant was a most valuable resource which the native plants of America offered to the new settlers. Tobacco had been in the possession of the native Indian tribes from remote antiquity, as is shown by the fact that pipes are found in very ancient graves and tumuli. The aborigines valued it for the peculiar effect upon the nervous system which has since endeared it to the people of every clime. When the country was first settled by Europeans, this narcotic seems to have been in use in their ceremonials by all the tribes which dwelt in regions where the plant could be grown. The habit of smoking was quickly adopted in Europe, and spread thence with singular rapidity to many parts of Asia. No other conquest has ever been so rapidly effected as that made by tobacco: within a century from the time of its ad-

vent in the Old World it spread beyond the limits of any European speech; it went, indeed, farther and faster than any faith has ever extended.

Although tobacco will grow in almost any climate, the valued quality of its leaves varies in a remarkable manner with each peculiarity of soil which nurtures it and the climate to which it is exposed. No other plant except the vine is known to be so curiously dependent on the circumstances of its environment for the qualities of its product. Thus, American tobacco came to have a peculiar value in the markets of the Old World, and it has maintained its place in those markets, although exposed to competition from the production in many other lands. In a short time after their settlement that part of the English colonies which lay to the south of the Delaware River became devoted in large measure to the industry of cultivating tobacco. Although the crops of this plant were hurtful to the soils of the region in which it was grown, they gave immediate and large returns in the way of exchange, and so the districts which relied upon this agriculture for a time prospered greatly. Notwithstanding the rapid way in which it exhausts the soil, we must count the culture of tobacco as of great profit to this country, for it quickly afforded the basis of an extensive commerce, and brought to the continent a body of immigrants and of capital for which it would have long waited if it had trusted to other bases of industry. Since the institution of tobacco farming this soil product has been the most steadfast basis of our exchanges with the Old World. Several other plants now exceed it in the quantity of exportable values they yield, but none other has been of leading value for so long a time. In a later century, namely, in the beginning of the nineteenth, cotton became the most important basis of our commercial relations with the Old World; but the profitable culture of this latter plant, which is a native of the East, came so late that it did not have much consequence in determining the fate of our race on this continent.

In connection with the early conquest over the rude nature of this continent, we must notice the development of the enforced immigration of African slaves. When the European population of this country was in a state of scattered and feeble colonies the greatest difficulty was experienced in obtaining a supply of people fitted for agricultural labor. The early experiments which had for their object the subjugation of the Indians were utter failures. Although the American savage is a vigorous being, he

is essentially untamable. When domesticated and forced to do steadfast labor he quickly perishes. For a long time the Old World supplied to this country an abundance of enterprising men, who were able to direct far more work than their own hands could do. So far as possible the demand for laborers was met by shipping to this country paupers and ordinary criminals, as well as many worthy poor persons who could not pay the expenses of the rather costly voyage. These people, under the name of indented servants, were sold into a temporary slavery to pay the cost of their transportation over the sea; but this resource was quite insufficient for the need; a large part of these servants when they became free proved to be active and industrious folk, who themselves demanded help in their enterprises. In this condition of the labor market the African slave trade, so far as the English colonies was concerned, began.

The natives of Africa in other centuries and climes had been much used as slaves, but they had never been to any extent associated with English people until they were introduced into the British colonies of North America. The conditions of Africa and of North America, as well as of the intervening sea, greatly favored the development of this forced immigration; Africa at this time was a teeming hive of savages, where the traffic in men had endured from a remote past. For goods of the value of a few shillings an able-bodied man could be purchased at many points along the Guinea coast. For a relatively trifling sum he could be transported to the colonies, where he commanded a price many times as great as he had cost the traders. It is doubtful if there ever was a more remunerative commerce than that in slaves during the seventeenth and eighteenth centuries. Although the ultimate effects of the slave trade were harmful to the best interests of the country, the immediate influence was in an economic way advantageous. It enabled the clear-headed and vigorous early settlers to hasten the work of subjugating the wilderness of eastern North America in a measure which would have been impossible to obtain if there had been no such servile labor at their command.

The condition of the surface of the continent, so far as it has effected the access of the people from the Old World to its area, is a matter which in a general way, as also in many particular instances, did much to determine the history of this country. So, too, the paths which lead into the interior portions of the continent greatly influenced the development and the prosperity of

the European settlers. These matters, as far as the details are concerned, will be more extensively treated in the following chapter, when the progress of European settlements is to be considered; we must, however, in this general sketch of the fitness of this continent for the uses of civilized men, give some general account of these conditions which control our internal and external commerce. North America is, as we have seen, a very insulated land; in the parts of its area where it is nearest to Europe and Asia it is so bound in frost or rendered so inhospitable by storms that it is not only uninhabitable, but to a great extent inaccessible to the people of the Old World. All its temperate and tropical parts are separated from the seats of the old civilization by wide seas. The Atlantic, at least in those portions of its area which lie between the shores of what is now the United States and Europe, is a storm-swept ocean, through which courses the eastwardly setting tide of the Gulf Stream. These conditions of tempest and current made it difficult for Europeans to find their way to this part of the world, and until the days of modern ships seriously hindered all intercourse between the opposite shores of the ocean. On the western side of North America the Pacific Ocean affords a much less dangerous pathway for ships voyaging to and fro from this continent. Moreover, there is a current in that ocean which tends to favor the passage from the coast of China and Japan to the region of Alaska. If these eastern shores of the Old World had been occupied by an adventurous seafaring people sufficiently advanced in civilization to be impelled to great voyages, either from curiosity or from commercial ambition, this country would doubtless have been settled from that side, and Europe might have been discovered by America long before the Columbian time. It was probably through this western way that savage man first came into this continent.

Scientific inquiry has made it tolerably clear that the American aborigines had been upon the continent for a very long time before the discovery by Columbus. From the region of the high north, which is inhabited by the peculiar races of the Eskimo, and the Aleuts to Cape Horn, the indigenous peoples bear a decided resemblance to each other. In fact, the aborigines of the American continent, at least in their physical characteristics, differ among themselves in a less degree than those of any other of the great lands except Australia.

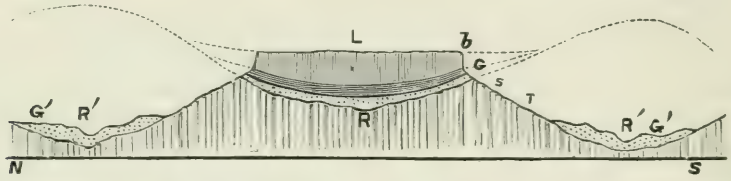
The evidence that the Indians have been long upon this land is of importance for the reason that we may take the people as

representing a very interesting experiment in the adaptation of men to the conditions which the continent affords. He has clearly been in the territory for many times the duration of its occupation by our race, and the result of his experiences with its soil, climate, and other conditions is in a way shown in his physical and mental character. We shall therefore in a general way examine into the state of the Indian, so far at least as it is necessary for us to do so with reference to the end we have in view, leaving the detailed consideration of matters concerning our aborigines to the chapter which treats of them.

The aboriginal peoples of the American continents appear to have been derived from northern Asia. Although this conclusion does not rest upon any identity of languages or customs, it is fairly supported by the evidence afforded by the general likeness of form of these peoples to those of the Tartar population of the Old World. In their general aspect the American Indians are not allied to any of the populations which inhabit the eastern border of the Atlantic. It is accepted by all students of the subject that man did not originate in the New World, but came into existence in the Old World group of lands and thence migrated to the twin continents of America. The most likely path for their passage into this country was by way of the peninsulas which so nearly join Asia to North America at Bering Strait.

Besides the evidence of a linguistic character which goes to show that the races of American Indians have long been upon the continent which they originally possessed, there is sufficient geological proof that some early form of man was in existence in North America in a period of great antiquity. Thus, in Calaveras County, California, a number of implements which are undoubtedly the work of human hands, and a well-preserved fragment of a human skull, have been found in the geological conditions which attest their great antiquity. The condition under which these remains were deposited seems to have been as follows: In an ancient day primitive men dwelt beside the river near where their remains are now found. Floods swept their bones and their implements from their dwelling or burial places into the bed of the stream, where they were mingled with sand and gravel and also with nuggets of gold. Then came a great outbreak of lava in the region about the head of the valley, and a stream of molten rock flowed down the gorge, filling the depression to a great depth. After it had cooled and the natural conditions of the country were restored, the rivers again began their slow task of excavat-

ing the rocks, carving a channel on either side of the lava stream to such a depth that finally the old river bed was left upon an intervening ridge, on the top of which a portion of the igneous rock remains in the manner shown in the diagram.



Section across Table Mountain, Tuolumne County, California: L, lava; G, gravel; S, slate; R, old river-bed; R′, present river-bed.

The time required for the succession of events indicated in this history was manifestly great. It is, in fact, difficult for the geologist to assume for its accomplishment a less period than ten thousand years, and it may have occupied a much greater interval of time.

In several other parts of the country other fragments of evidence have been obtained, all tending to show that the human race has been upon this continent for a time which far antedates the beginning of recorded history in any realm. It is not yet certain that these very ancient folk were of the same stock as our American Indians; but as there is no reason to suppose that peoples of diverse origin have occupied this land, or that there was any interval during which it was uninhabited, it is probably safe to assume that the men of Calaveras and their contemporaries in other parts of this continent were the ancestors of the folk whom the Europeans found here.

Although the race of North American aborigines has been for a great time on the surface of this continent, they have in general not advanced above the level of the savage life. In the Cordilleras, from Arizona to Chili, at various points, particularly in Mexico, Central America, and Peru, these people attained a social and political station a little above the level of the normal savage. They came to depend upon agriculture for their subsistence, learned to build considerable architectural constructions, to model clay, and even to carve stone in a rudely artistic manner. Imaginative chroniclers have told us much concerning these peoples whom the Spanish conquerors encountered, and historians have hastily based their judgment on these reports, and thus have come to describe in glowing colors the civilization of Mexico and

Peru. More critical modern inquiries have made it clear that the culture of these people has been much exaggerated, and that at their best, when measured by the standards of a true civilization, they are found to have attained to only a little way above the savage state.

We have now to consider the reason why our North American Indians, who have evidently been so long upon a continent well fitted for the uses of civilized men, have failed to advance beyond the primitive condition of men. We can not fairly attribute this retardation in their social development to an original lack of intellectual capacity. On the whole, these people seem to have more than the usual measure of ability which is found among savages. They are physically vigorous, and many of their chiefs and medicine-men have shown great intellectual power. Tecumseh, his brother the Prophet, Pontiac, Sequoyah, and a host of other pure-blood and half-breed Indians, have shown capacities as commanders, orators, and inventors which were distinctly of a high grade. As compared with the savages of other lands, it is safe to say that our Indians are people of rather uncommon ability. Why, then, have they remained not only undeveloped, but incapable of taking the civilization which our own race has offered to them?

The fitness of a people to enter on the way of civilization probably depends upon a great variety of conditions. We can therefore expect from our inquiry to ascertain only a part of the influences which have made it impossible for these folk to acquire of themselves, or to accept from our hands, the conditions of an advanced culture. Some of these retarding circumstances are tolerably evident. It is easily seen that the aborigines of this country lacked the peculiar advantages which were due to the possession on the part of Europeans and Asiatics of domesticated animals. In the Americas all the important groups of creatures which have been subjugated in the Old World are lacking. In the original state of the continent there were no horses, bulls, sheep, pigs, elephants, or buffalo—the species from which the Old World people derived their more valuable helpers of their labor. The American bison, though in many ways resembling the Asiatic buffalo, has proved undomesticable. The only American animal which has ever been made to serve as a beast of burden belongs to the South American genus which contains the vicuna and alpaca. These closely related varieties were reduced to subjugation by the Peruvians, and, besides yielding good

fleeces, were of some service as beasts of burden. In general, however, the aborigines of America had but one domesticated creature, the dog.

It is difficult to see how primitive folk can, without the aid afforded by beasts of burden, pass beyond the boundaries of a somewhat elevated savagery. The steps which lead from the lower to the higher state of human culture are mainly taken through the culture of the soil and the extension of commerce, which depends upon tillage and upon manufacturing industries. As long as men are limited in their tillage work to the labor of their own hands, it is impossible for them to secure crops in sufficient abundance to provide for more than their most immediate needs. At best they may be able each year to provide for their own subsistence; they can never have any store for exchange with their neighbors. It is, in general, safe to say that the substantial foundation in the way of food, on which civilization must always rest, can not be attained by any men who rely altogether upon the strength of their own hands.

There is another influence arising from the possession of domesticated animals which has much effect on the culture of man. The care of these creatures is a constant incentive to those habits of forethought which tend to the elevation of the race. In northern countries some provision has to be made for the food of these creatures; they have to be herded and cared for. In fact, the possession of such dependents greatly enlarges the responsibilities of men, and compels them to adopt an orderly and continuously laborious life. In the advance of civilization the pastoral or herding habit has normally afforded the intermediate step between the life of the hunter and that of the truly sedentary man.

The retardation in the social and economic development of our North American Indians is doubtless in part to be explained by the lack in this country of those isolated tracts of land such as are afforded by the peninsulas and fertile mountain valleys of the Old World. All parts of this continent are so readily traversable that savages could easily range from one district to another. There was no chance for a tribe well protected by geographical boundaries to work out within itself the motives of a civilization. No sooner did any division of the aborigines adopt a somewhat sedentary life, enter on agriculture, and obtain a little store of wealth, than they were exposed to the cupidity of their more savage neighbors. Thus it came about that the greater part of our American tribes were pushed hither and

Immigrants' Landing, Ellis Island, New York harbor.

yon in their contests with the hostile people which surrounded them.

We must now turn our attention to the effect arising from the primal conditions of the continent on its settlement by Europeans. We shall begin this part of our considerations with the steps which led to the colonization of the country; for the ways in which our ancestors were guided to this land, and the influence of the country on their success, are evidently of the utmost importance. As we shall shortly see, these physical circumstances in the end determined that North America should become the great seat of the English race.

It requires some exercise of the imagination as well as a knowledge of the dry facts of history to understand the motives which led to the settlement of America. The object of Columbus's voyage was to find a way to western Asia. It had long been known that the far East was occupied by rich and populous nations, for some of the products of that country had for centuries found their way to the European world. When Columbus returned from his voyage he supposed that he had discovered the fringes of Asia, and for a long time thereafter it was not recognized that he had made a much greater discovery, in that he had found a new world. It was not until some time after the Columbian voyages that Europe awoke to the understanding that a vast land unpossessed by civilized peoples was opened to its enterprise. For a time the title to these new-found lands, which the Pope had given to Spain, as well as the maritime dominance of that country, in a measure deterred the northern states of Europe from seeking any share in the opportunities which the country afforded. It was not, indeed, until near the close of the sixteenth century that France, Holland, and England ventured to claim a place for their people on the western shore of the Atlantic. With the defeat of the Spanish armada the old fear of Spain, which had so long rested on the peoples of northern Europe, in good part passed away. With the rise of religious dissent in those countries the authority of the Pope became less absolute. With these changes in the conditions of northern Europe all its maritime folk hastened to snatch what they could of its lands from the Spaniards.

Fortunately for these laggards in the race for Western possessions, circumstances had led the Spaniards to found their American empire in the region about the Caribbean Sea. In resorting to this part of the continent they followed essentially

the path which Columbus had traversed—a way which was most favorable to transatlantic voyages, for the reason that it lay in the belt of the trade-winds, and was therefore well south of the stormy path of the North Atlantic; moreover, the Caribbean districts afforded a climate sufficiently like to that of Spain to attract its colonists. The indigenous peoples of this region were easily subjugated; the country contained many mines of silver and some gold-bearing deposits, which appealed to the cupidity of the invaders. Such explorations as the Spaniards made in those portions of North America which lay to the north of the Gulf of Mexico did not tempt them to extend their conquest in that direction. Those who came back from De Soto's unhappy expedition, and the survivors of the various other explorations, described a country of pathless woods or sterile plains, inhabited by dangerous savages, and without mines of precious metal. Therefore, even a century after the first Spanish settlements in America were established, the great body of North America, all of the area indeed which lies to the north of the Gulf of Mexico and the Rio Grande, though claimed by Spain, was not only in no sense occupied by that power, but remained, except for its shore line, substantially unknown.

It was as fortunate for the peoples of northern Europe as it was unfortunate for Spain that her colonies were planted in the tropical region of America, and that she neglected the more northern districts of our continent, for thereby the fairest portions of this land, or at least those which are best suited for the use of the vigorous people of our race, escaped from the dominancy of a state which has proved itself to be unfit to advance the interests of dependencies in any part of the world. If the Spanish Government had recognized the true value of the district which lies to the north of the Gulf of Mexico, it would doubtless have made haste to plant forts and trading-posts along the Atlantic coast, thereby securing an actual hold upon the country. As it was, save in rare instances, it limited its opposition to the appropriation of the country by other states mainly to remonstrances.

Of the three northern states of Europe which sought to found colonial establishments in North America, the French at first displayed by far the greatest amount of vigor and enterprise. They chose for the seat of their establishment the northern coast of Florida, near the mouth of the St. John's River, and the region about the Gulf of St. Lawrence, from near the mouth of the Penobscot to Labrador. Their colonies in Florida were of brief

duration. Although France and Spain were at peace, the Spanish authorities in the Caribbean district shortly assailed the French settlement, captured their forts, and ruthlessly butchered the people. The French settlements in the State of Maine were also broken up by the English, but their possessions in Nova Scotia and along the shores of the gulf and the river St. Lawrence remained in their possession for more than a century.

The Dutch, with their usual sense in choosing the sites of their commercial establishments in foreign lands, appropriated the region along the Hudson River, a place which, next after the St. Lawrence, had the greatest strategic value as well as the greatest importance for the purpose of trading with the natives of any position on the Atlantic coast. The British were the laggards in the race for the possession of North America. To them fell at first the coast of New England and that part of the shore which lay to the south of New Amsterdam and to the north of an undefined line beyond which the Spaniards might be expected to assail them. Owing to their lack of energy in exploration and the insufficient organization of their colonial establishments, only the shreds of the continent fell to the English. One hundred and fifty years after the discovery of America it would have seemed to a philosophical student of the plantations in this country that the English-speaking people had but little chance of attaining a dominant place on the continent.

Although the French were driven out of Florida by the Spaniards, they still held a most important part of the coast, the region about the mouth of the Gulf of St. Lawrence, and had founded posts along the river of that name at a greater distance from the shore of the Atlantic than had been attained by any of the other colonists. In the latter part of the seventeenth century it seemed likely that this people would succeed in permanently establishing themselves in the great central valley of the continent. The geographical position of the Laurentian Valley greatly favored the efforts of the French to win control of these interior fields. Notwithstanding its rapids and the great waterfall of Niagara, the main channel of the St. Lawrence River and the lakes of this vast water system afford for more than half the year an excellent navigable way as far west as the meridian of the Mississippi. It is, in fact, the only natural path from the Atlantic shore to the interior of the continent. With the aid of their intrepid explorers they made excellent use of this opportunity, and by their dexterity in negotiating with the Indians they soon brought the savages

of the interior to consider the French king as their overlord. The theory which controlled the management of the French colonists favored the rapid extension of their nominal authority. The aim of the French Government was to civilize and Christianize the Indians, and to make them faithful servants of France. It appears never to have been the object of that state to take any general possession of the soil for the sole uses of their emigrants. They thus avoided one of the principal grounds for dispute with the native people, and this element of contention lacking, it was easy by presents and persuasion to bring the Indians into something like accord with their imperial plans. If our native Americans had been of a character to be either civilized or subjugated, the French project might have succeeded; but they are an indomitable people, and so, except for the fringe of settlements about the Gulf of St. Lawrence, the empire of France in the New World was soon proved to be but a flimsy affair.

If the French had succeeded in discovering and controlling the mouth of the Mississippi, the fate of their settlements in the valley of that river might have been more fortunate; but, although they came to know the upper parts of the stream and to make some use of those waters, the mouth of the river lay in the stronghold of the Spanish power on this continent, from which the Spaniards were not dislodged until it was too late for the French to make head against the growing power of the English colonies. Thus, though the French settlements represent one of the most interesting and ambitious efforts at colonization which the world has ever known, the essay was in the end futile.

Owing to their geographic position the British colonies on the Atlantic coast were deprived of all access to the interior. Except for the break made at the Hudson River, the coast from the Gulf of St. Lawrence to northern Georgia is bordered a little distance back from the shore line by the mountain ranges of the Appalachian system. Although these mountains have no great height, they were in their native state singularly difficult to traverse. They are intersected by but few rivers, and these, save the Hudson, were essentially unnavigable. The whole of the area was covered by dense forests, which were not of an open nature, but were beset with a dense tangle of undergrowth. It is characteristic of this forest brushwood that it abounds in vines to a degree seldom found in extra-tropical countries, and these creeping plants knit the undergrowth together in such a manner that it requires the axe to clear a path passable to horsemen or pack-

animals. Over a large part of the surface north of central Pennsylvania the ground was densely covered with glacial bowlders, which afforded no footing for horses, and in every part of this district swamps abounded. In the primitive condition of this country there was very little intercourse between the Indians of the Atlantic coast and the interior of the continent, and as long as the British settlements remained near the shore they had nothing to fear from other than the neighboring savages.

The pathway into the interior by way of the Hudson and the Mohawk Valleys was not embarrassed by mountain ranges, but its use was not open to the British for some time after the settlements were founded, and even when they had gained possession of this way it proved of little use to them. It is true they could sail up the Hudson to the mouth of the Mohawk, and thence proceed up that stream for about a hundred miles farther into the wilderness, but between Utica and the shores of Lake Erie the country, on account of its boggy nature, was difficult to traverse; moreover, it was densely forested, and its western portion was inhabited by a large body of the most warlike and able-bodied of our North American Indians. Thus, the British colonists were hemmed in along the Atlantic coast, and for the first century of their development did not dream of obtaining control of the vast, remote, and as yet mythical region of the Mississippi Valley. They were sufficiently content to guard their sea-front and their northern boundary from the French, and to hold their own against the Indians and the Spaniards on the west and south. The narrowed conditions of the British colonies, due to the physical limits which geography had set to their enterprises on this continent, were in the end much to their advantage. Owing to the limited area which was accessible to them they were compelled to form tolerably dense settlements, which afforded conditions favorable for culture and political advancement; they were induced to institute manufacturing industries, to obtain a subsistence which the scanty soil frequently denied; and they were also led to develop a great seafaring industry, which was at once in a high measure educative and the source of much wealth. Thus, while the Spaniards and the French were winning what has proved to be but a shadowy empire, while they were scattering their settlers among the indigenous races and mingling their blood with that of a lowlier people, the New World England grew strong and like the mother-country in all the elements of its strength—in the love of social order, of religion, and of liberty.

With the French, the Spaniards, and in a certain measure with the Dutch, the colonial theory has always been to reconcile themselves with the aborigines and turn them to their tasks. The French and Spaniards have frequently intermarried with the natives of this country, and thus have to a great extent lost the native purity of their blood and with it the ancient quality of their people. The English motives have in general not admitted of any other than hostile relations with the American aborigines. After a brief effort to educate and to use the savages as domestic servants—an effort which was singularly unsuccessful—the British adopted the plan of dispossessing the Indians, either by war or purchase, or at times by a combination of these methods of obtaining title to the land. Where, as in rare instances, the Indians had not been driven out of the country which the descendants of the English have occupied, they have been forced upon reservations, generally denied the rights of citizenship, and been held in all social relations as aliens. The result has been that the aboriginal folk have been entirely without influence upon the population of the Atlantic coast. Scarcely a trace of blood is admixed with the English of that district, and the natives have had no effect whatever on the conduct of its affairs.

At the end of the first half of the eighteenth century the English-speaking people of the Atlantic coast numbered about two and a half million souls. Although they had developed from many separate centers and differed a good deal in certain details of manners and of speech, they had in no wise departed in any important way from their ancestral quality. They were a vigorous, laborious, though very provincial people. Even the most foresightful of them appear to have had little conception of the part they were to play in the history of the continent. In the second half of the eighteenth century they came to a knowledge of their strength. The first stage of their awakening was brought about by the remarkable campaign which led to the capture of the town of Louisbourg, in Cape Breton, and in time to the consequent overthrow of the French dominion on this continent. Although the siege of this town was in a military sense a small affair, and the immediate results unimportant, it was, as far as the land operations were concerned, a colonial enterprise, and the success greatly enhanced the esteem in which the British-Americans held their power. The capture of Louisbourg was to the English colonies in America in a certain way like the taking of

The Rocky Mountain goat.

Troy by the peninsular Greeks. It gave them a sense of military prowess to which up to that time they had no title.

The success of the Revolutionary War, although the loss of life and property which it entailed was most costly to the people of the colonies, affirmed and extended the national motive of our people. Many now began to dream of that Western empire upon which as yet only a few explorers and traders had set foot. The westward-harking motive was naturally strongest in Virginia and Maryland, for the reason that the population in that part of the colonies was more purely agricultural than elsewhere, and the people had acquired the habit of dwelling far apart on large plantations. Moreover, the Virginia scils had already been to a considerable degree impoverished by tobacco, which, as before remarked, taxes the earth in a very serious manner. Furthermore, Virginia claimed the title to the district of the Ohio Valley under the old charters granted by the crown. At the end of the Revolutionary War this Commonwealth owed large debts to her soldiers, and was without means of paying them save in land which lay beyond the mountains.

Although the Alleghany Mountains stretched as an almost continuous barrier across the western border of Virginia, a geographical accident had provided a way more passable to the frontiersman than any other path across the Alleghanies by which they might gain access to the valley of the Mississippi. The wide and beautiful valley of the Shenandoah, which lies between the foot of the Blue Ridge and the North Mountain, had already been occupied by the Virginian settlement. Following this valley to the southwest to the head-waters of the Roanoke, it was possible to pass over a country of gentle slope across the principal ridges of the Alleghanies and thence into the valley of the New River, or upper Kanawha. Following up this stream for a short distance, the travelers entered the broad vale of the upper Tennessee, through which it was practicable to make a path to the breach in the Cumberland range known as Cumberland Gap. Traversing that pass, access to the open forests of central Kentucky was easily obtained. Although for many years the traders with the Indians had threaded their way through the difficult wilderness of the Alleghanies into the valley of the Ohio, the first exploring parties which entered Kentucky with a view of settlement made their way on foot along the above-described route. Among the many advantages which this trail presented we must include the immunity from contact with hostile Indians

which it afforded. As the result of long-continued intertribal wars, all the portion of the continent between the Shenandoah, the upper Tennessee, and the Ohio Rivers was without any permanent Indian settlements. It was only occasionally traversed by hunting parties coming from the north of the Ohio or from the region south of the present boundary of Kentucky. Thus, in passing along this trail leading through Cumberland Gap the first settlers of the Ohio Valley were fairly well protected from the risk of meeting their ancient enemy; and when they entered the fertile district of Kentucky they did not have to dispossess any aborigines, for they had deserted the district, or at most used it as an occasional hunting-ground.

The settlement of the district west of the mountains was begun in the first years of the Revolutionary War, and it went forward so rapidly that, before the Indians under the lead of the British combined for the overthrow of the colony, it had attained such strength that it was able to maintain itself against their repeated though desultory assaults. After the Revolution the disbanded soldiers of Virginia, North Carolina, Maryland, and Pennsylvania poured into the country in such numbers that this outpost of our civilization soon became a strong and warlike State. Within twenty years from the beginning of the settlement it was able of its own strength to insure itself from any assault which the aborigines could deliver. Thus the conquest of the great continental valley was begun with the occupation of Kentucky, and from that base of supplies and of military strength the occupation rapidly extended to the north, south, and west of this vast field.

It required nearly a half century of arduous labor in war and peace to insure the English conquest of the district to the east of the Mississippi. The Spanish, and afterward the French, long held the mouth of the great river. The British, with their Indian allies, maintained their hold in the regions about the Great Lakes; and the Indians, who occupied the valleys of Georgia, Alabama, and Mississippi, barred the extension of the empire on the south. Nevertheless, after about 1790 the hold of our people upon the central district of the continent was so firm and the increase of their well-constituted society was so rapid that there could be no doubt as to the final issue of the struggle. It is, indeed, from that time that we may date the full development of the sense that the continent in a way belonged to our nation.

Much of the success which attended the English invasion of

the Mississippi Valley was due to the peculiar character of the men and women who occupied this frontier. If they had been deliberately selected by some wise statesman for their peculiar task the choice could not have been better fitted to the end in view. If the occupation of the country had been trusted to ordinary immigrants from Europe it is very doubtful if the Ohio settlements could have maintained themselves during their early trials. If we compare the fate of these isolated people with that of the early English settlements in the Virginia district, we see how much depended on the quality of the folk who did outpost duty in the region west of the Alleghany Mountains. The first settlements in Virginia and North Carolina were destroyed, or languished for many years, because of the inability of the folk to contend with the wilderness and its savage inhabitants. The men who made these Western settlements had for a century and a half been in training for such arduous work. They and their ancestors had learned to fight in their struggles with the Indians, the French, and the British; they had, moreover, acquired the more precious education of a political sort which enabled them to act together in organizing and defending their societies. They were not only war-proof, but trained in the founding of States and in the maintenance of civil order.

To understand the difference in the fate of the Spanish and French colonies on the one hand, and those of the English on the other, we must take account of the vast and most important contrast which existed in the social motives of these two groups of settlers in this country. The Latin colonists never learned to act together in the manner of the British people. Their political history in this country is one long story of internecine difficulty, distrust, and treachery. Their colonies were weakened by conspiracies and dissensions, and the efforts of their noble leaders were often made fruitless by the untrustworthiness of their subordinates. It is a most noteworthy fact that, in all the trials to which the early settlers of our race were exposed in this country, the treasonable motive is conspicuously absent. Even in the difficult conditions of the Revolutionary War there was but one act of treason on the part of a leader, and only a single conspiracy which seems to have had any taint of treason in it, that which was led by Conway. During all the trials to which the Kentucky settlements were subjected during the last century, only one man fairly incurred the suspicion of treacherous conduct, and his offense consisted in the rather indistinct crime of taking pay as a

retainer from the Spanish Government during the time when it seemed likely that Kentucky might be induced to seek the protection of that power. However fierce the private feuds of our frontier people have been, they have always acted in a willing and faithful manner in defending the public weal.

With the close of the eighteenth century the outposts of our people were firmly planted in the Mississippi Valley, along a line extending from the Great Lakes to the Southern Tennessee, and the skirmish-line of the invading army had in Kentucky been pushed nearly as far as the Mississippi River. The first quarter of the nineteenth century saw the French and Spaniards displaced from the region about the Gulf of Mexico as far west as western Louisiana, the British influence destroyed in the region south of the Great Lakes, and the Indians of the Northwest so far crippled that they were no longer a menace to the developing States. In the second quarter of the present century the war with Mexico gave the vast district of Texas to the Federal Union, and displaced the Spaniards from all that portion of the Pacific coast which lies to the north of the Gulf of California, thus insuring to the descendants of the English folk the control of the part of the continent which is well fitted for their use. The district of Central America and Mexico, though a beautiful country, rich in the resources of climate, soil, and under earth, is, as experience has shown, not a favorable region for the uses of our race.

The last step in clearing away the settlements of other than kindred people from the northern part of the continent was brought about by the purchase of Alaska from the Russians in 1872; the only remaining truly foreign holdings, those in possession of other than English-speaking people, being the trifling settlement of the French on the island of Miquelon near Newfoundland and the few Danish villages on the southwestern border of Greenland. Thus, in less than one century, the English colonies passed from the state of a narrow fringe along the Atlantic coast to the possession of a continent. No other conquest has ever been so swiftly and surely made. It differs from all other invasions of a great land in that it was not a military occupation, but a process of settlement. Although the frontier was the seat of almost constant battle, the warlike element of the great exploit is really its most trifling feature. The true grandeur of the march consists in the fact that it was the ongoing of a civilization; the axe and the plow were the principal weapons which armed the hands of the people. The result has been the delivery to the English-

speaking people of the one continent which seems eminently fitted for their use.

Since the ejection of the French from North America and the subordination of the Spanish power upon the seas, the advance of the folk of English origin in North America has mainly depended upon the physical features of the continent. All the subsequent conquests of the people have come about in a most natural way. Arms have had some share in the march of events, but in no part of the Old World have the steps which have led to the establishment of great States been generally so free from the influences of war. The conquests have been won mainly through wholesome human labor, through the self-sacrifice of men who, though ready at all times for battle, have devoted themselves to the peaceful tasks of their time. The extension of our domain in the Mississippi Valley and the Pacific slope of the continent has principally depended on the features of a geographical nature which characterize that part of the continent. The physical conditions of the Mississippi Valley were singularly favorable to the rapid extension of our population over its surface. The streams of that great river system are more generally navigable than those of any other great valley in the world, except the Amazon. For the greater part of the year it is possible with vessels of considerable draught to traverse not less than ten thousand miles in length of these water ways. When the country was first settled, boat journeys were attended with difficulty, because the voyagers had to trust mainly to the impulse of the current. It was a most arduous task for the pioneers to drag their boats on their return journey from their seaport at New Orleans to their settlements along the Ohio River. Fortunately, however, in the early days of this century the steamboat became a successful economic device, and, as its use rapidly extended, all the shores of navigable rivers were laid open to settlement. Moreover, by means of these craft it was possible to transport large bodies of troops to any part of the country which might be menaced by warlike Indians, and thus the danger from the savages was reduced to the risk which arose from local outbreaks; the steamboat rendered anything like a general Indian war in the great valley quite impossible.

The next step in the settlement of the country was taken when the railway came into general use for distant land transportation. Until that time the communication between the East and West had been carried on by means of the few good wagon-roads, and by certain canals which more or less completely connected the

navigable waters of the Atlantic coast with those of the interior of the continent. Although these canals, combined with other natural waterways, were of vast advantage to the frontier people, they necessarily left many extensive tracts without means of swift and cheap communication with the markets of the world. On the establishment of this connection in the manner which it has been attained by railways, the advance of the interior district in population and wealth most intimately depended. The same geographic features which insured the extensive navigation of the Mississippi system of streams, made all the parts of this valley which were suitable to agriculture remarkably well fitted for the construction of railways. The whole of this district is a region of great plains, across which the iron ways may be carried at a relatively slight cost. In fact, over much of the surface no important engineering work except the bridges over the streams is required in the construction of these routes.

One of the most advantageous features connected with the central trough of the continent consists in the unbroken character of its fertile land. From the base of the Appalachians to the foot of the Rocky Mountains scarcely any part of its surface is too rude for agriculture. Certainly less than one fifteenth part of the dry land in this area can not be made fit for the plow. In other parts of this country, and over the greater portion of the Old World, the areas which are suited for human habitation are generally of relatively small extent, and divided from each other by great stretches having an untillable surface because of its mountainous nature. Although this arrangement of a continent is extremely advantageous in developing separate centers of civilization, and in forming varieties of the races, it is not well suited for the habitation of a people who are to remain closely bound together by political and social ties. The central portion of North America affords the largest intimately connected field which is suited to the uses of our race. The nature of the surface indicates that this folk is to have a solidarity greater than that of any other people in the world.

The rapid settlement of the northern portion of the Mississippi Valley was to a certain extent favored by the timberless character of that country. In all the other districts over which the English-speaking people had hitherto extended their domain they had to win their field from dense forests. Only those who have taken part in clearing away a primeval wood such as covers the Appalachian district of North America can imagine how great

has been the labor required to win the fields to the uses of civilization. From the time when the axe is first laid to the trees, it usually requires at least ten years for the stumps and roots to decay so that the plow may find a free path. With certain of the hard-wood timber trees twenty years of decay will scarcely effect this result. Until the soil is cleared of these obstructions nothing like systematic agriculture is possible. Where the woods are dense a farmer's lifetime may be spent in winning twenty or thirty acres from their control.

When the advancing front of our population escaped from the Appalachian woods and passed into the prairie district of the Mississippi Valley, they entered on a region where the soil is generally unforested, and where it needs only the help of a large plow, drawn by four horses, to put the surface into condition for a great variety of crops. It was holiday work to subdue the prairie to men who for generations had been engaged in a battle with the primitive forests of the Atlantic coast. The result was, owing to the open character of this country and the rapidity with which it was made accessible by railways, that the rate at which the frontier line moved to the west became vastly greater than before. It demanded a century for the English-speaking settlements which were planted on the shores of the Atlantic to work back as far as the eastern front of the Appalachian Mountains. Another hundred years went by before they had pushed the frontier to the border of the prairie district; but, on attaining the open lands of the Mississippi Valley, it required less than half a century for the people to occupy every part of the surface sufficiently fertile to warrant its immediate possession.

In a general way we may say that, in the first hundred years of our history, the westward movement of the frontier took place at a rate not exceeding one mile a year. In the second century the speed of movement was more than doubled, amounting to between two and three miles a year. After 1830 the frontier ceased to have anything like a definite line, for the immigrants swarmed to the westward along all the ways of communication. It is safe, however, to say, that in the latter part of this century the open country of the continental fields has been won to the uses of men with more than ten times the speed which was made in any part of the preceding centuries.

While much must be allowed for the influence of the steamboat and the railway on the swift settlement of the Mississippi Valley, a great deal of this swiftness of movement has been due

to the long education of our people in the work of subjugating a new country. This education has included a training in self-reliance which is necessary for men who are to do duty as frontiersmen. They must know the art of winning an immediate subsistence from the soil, as well as how, in the midst of other cares, to frame and consolidate their social and governmental systems. These lessons the Americans have learned in a measure which has been attained by no other people. It seems, indeed, unfortunate that there are no other lands for them to conquer. Doubtless the energy involved in these vast pioneering toils will find its place in other activities—in the development of the resources of the under earth and in the betterment of our state—but the peculiar skill demanded of the frontiersman has almost ceased to have a place in the life of this continent.

The greatest difficulty which our people have encountered in dealing with the conditions presented by the central portion of the continent has arisen from the presence of the Indians in that field. Although the wars with the aborigines were often sanguinary and always harassing, the most serious obstacles were not those of a military sort. It has always proved easy to overcome the armed resistance of the savages, but always extremely difficult to make any satisfactory disposition of them. Although at no time has the population of these native folk north of the Rio Grande exceeded three hundred thousand souls, their habits were such as to require a great extent of land for their subsistence. In general, it may be said that the Indian needs from one to three square miles of land for the support of each of the members of his tribe. If confined within a smaller area, at least until he has adopted the agricultural habit, he is sure to become restless and predatory. Thus it has come about that our people have adopted the rather curious plan of confining these savages within large reservations, around which the tide of civilization has soon closed. In time these great areas given over to savagery have proved to be exceedingly inconvenient, whereupon the tribes were forced to move westward on to lands which were by new treaties devoted to their use. These great territorial penitentiaries of the Indian reservations have usually been badly administered; their unhappy inmates have suffered much in the way of hardships and misgovernment. Their white neighbors have not been given to making any allowances for the inherited qualities of these primitive people; the result is, that our Indian system appears as the most unsatisfactory part of our American history.

West Point and the Hudson River.

Although much of the criticism which has been directed against our administration of Indian affairs is doubtless well founded, few of the critics perceive how almost insuperable are the difficulties of dealing with an indigenous people having the qualities of this native American race. Centuries of experience has taught us that these folk are, from the point of view of our civilization, essentially untamable. In general, they can not take up the burden of our Anglo-Saxon civilization, or even accommodate themselves to our ways of living. Here and there, though rarely, some of the tribes, particularly those of the more southern parts of the country, when the more desperate element of the population has been weeded out by war and the blood somewhat commingled with that of the whites, have become soil-tillers, and thereby ceased to be troublesome to the state. The choice before our people in dealing with this indomitable folk lay between a method of extermination, such as has been practiced in other lands, and something like the system which we have adopted. A cruel-minded race such as the Romans would have made short work of the Indian problem. Each war would have been one of extermination, and the primitive tribes would have been slain or enslaved, and thus removed from the field. The difficulties which we have encountered in dealing with the Indians have been in large measure due to the fact that even when exasperated by conflicts with them our frontier people have retained a large share of the just and humane motives which are characteristic of our race. They have recognized the fact that our own people were the invaders of the Indian's realm, and there has been an element of the apologetic in their treatment of the natives each time they came to make peace with them.

Although the foregoing sketch of the conditions which determined the fitness of this country to the uses of our race is inadequate, it may serve to show the reader how great and admirable was the fortune which gave this broad and fruitful land as the field for the development of our people. It is clear that it is better suited for the needs of the northern Aryans than any other extensive territory which has ever come into their possession. From their first scanty holding on its shores they have extended their empire with a swiftness and certainty which of itself shows how well suited the land was to their needs, and how well they were themselves suited to the inheritance.

CHAPTER II.

NATURAL CONDITIONS OF THE EAST AND SOUTH.

To give in brief the results of our knowledge as to the regions of North America which are unfit for the use of our people, we may state that about one fifth of the area of the continent is made desolate by cold. About another fifth is useless except for the maintenance of flocks and herds, for which it will afford a scanty pasturage. A certain part of the remainder, in all about one hundred and twenty thousand square miles, is now in the condition of fresh-water swamps and marine marshes, the greater part of which may be won to the uses of agriculture, and will doubtless in time be made serviceable to our people. In the absence of complete studies of the country, such as the United States Geological Survey is now undertaking, it is not possible to make a definite estimate as to the portion of the continent which is fit for the uses of agriculture. The foregoing estimates must therefore be taken as of a general nature. The proportion of the total area of this great land which may serve the needs of highly organized societies is greater than that of any other continent except Europe—a land which indeed is not truly continental in its nature, but is, in fact, the mere western fringe of the Asiatic area.

We turn now to a somewhat detailed consideration of the several geographic districts of the continent, beginning our task with the Atlantic coast, where the geographic variety of the country affords more distinct fields than in most of the other parts of the continent.

St. Lawrence District.

The most northern division of the Atlantic coast which affords the conditions required by civilization is that which lies about the mouth of the St. Lawrence River and the gulf of that name. This part of the continent is made up mainly of a group of peninsulas and islands, which inclose a great gulf or shallow sea. The peninsulas are those of Gaspé and Nova Scotia, and the islands of considerable size Newfoundland, Anticosti, Prince Ed-

ward, and Cape Breton. The surface of this region is extremely varied in contour, its northern and southern parts in Labrador, Nova Scotia, and Cape Breton being occupied by low mountain ranges, the worn-down roots of what were formerly elevated chains. The climate of this field is very much affected by the conditions of the neighboring sea. The Gulf of St. Lawrence, which to a great extent freezes over in the long and cold winters, permits the arctic winds to have free access to all parts of its shore, and the waters remain exceedingly cold during the summer season. A southward setting current from Baffin Bay drifts the arctic ice as far south as Newfoundland, and maintains the temperature of the water during the whole year at a low point. The result is, that this part of the continent has about the climate which characterizes Sweden and Norway—countries which lie nearly a thousand miles farther north.

The soil of the Laurentian district, at least of the region south of the Labradorian shore, is prevailingly good. It is mainly composed of glacial waste, the whole of this region having been deeply overridden by the glacier of the last ice time. Owing, however, to the shortness of the summer season, the agricultural possibilities of the field are rather limited. The island of Newfoundland is, on account of the excessively humid and cold summer, almost beyond the limits of culture, the crops being restricted to certain garden plants and some of the hardier small grains, which may be reared in the southern portions of the island. The island of Anticosti, though owing to its limestone foundation it has a very good soil, is also so far north that it seems a field where tillage will always be a precarious basis for the support of a population. Prince Edward Island has a remarkably fertile soil, and the climate is exceedingly well suited to small grains and to forage crops, as well as to the growth of potatoes and other roots. The same may be said of Cape Breton, though on that island the soil is on the whole much less fruitful, owing to its stonier nature, than in the region to the west. The peninsula of Nova Scotia and the mainland of New Brunswick on the west afford an excellent soil and the climate well suited to all our field crops, such as are reared in the northern United States, except Indian corn, which through all parts of the Laurentian district will not mature its grain save in exceptional summers. That portion of the Laurentian district which lies along the tide-water belt of the St. Lawrence between Gaspé and Quebec, owing to its somewhat inland position, has a more strenuous climate than the maritime portion

of the provinces. It has, however, a fertile soil, which owes its quality in large measure to the chemical condition of the rocks, which were broken up by the glacier and transported from farther north into this field. The earth in this territory has proved remarkably enduring to the tillage of a rather imperfect kind, to which it has been subjected for about two hundred years.

The population of the Laurentian district is of an extremely varied nature. In the main it consists of two diverse strains of north European blood—British, mostly from northern Britain and Scotland, and northern French, presumably in the main descendants of the Scandinavians, who in the early centuries settled in that part of Europe. Intermingled with these two varieties of Aryan folk there is a certain though not great amount of Indian blood, the remnant of the ancient rather peaceful tribes which dwelt about the St. Lawrence. The French part of the population mainly dwells along the banks of the St. Lawrence River, where they form by themselves a large and very isolated population, retaining their native speech and customs. Their physical condition, after more than two centuries of exposure to a strenuous climate, seems to be excellent. They are vigorous, extraordinarily fruitful, the birth-rate probably being as great as among any other Aryans. Although their development is retarded by the lack of variety of their industries and their exceedingly provincial state, they appear to be a people of excellent natural capacities. The great tide of emigration which is sent forth from this French district to the United States affords excellent laborers in every department of industry, and it is the testimony of those who are acquainted with their work in the mechanic arts that they have in many cases inventive minds.

Eastern Nova Scotia and Cape Breton are in the main settled by immigrants from the Highland section of Scotland; the greater portion of them retain the ancient Roman Catholic faith, and maintain many of their ancient customs. The admirable physical condition of this population, which has been upon the soil for about a century, shows that the climate and other conditions of environment are well suited to them. Western Nova Scotia and New Brunswick received a large part of their settlers through the emigration of the Tories at the outbreak and the close of the Revolutionary War. Many of these emigrants from the revolting colonies took their negroes with them, and this element of the population has been somewhat added to by refugees from the West Indies and the United States in the later days of slavery on

Victoria Bridge, Montreal.

this continent. Although the amount of negro blood in the Canadian maritime provinces is small, these people afford interesting evidence that, although the African does not increase in numbers in this high northern latitude, he seems to be fairly well able to withstand its severe climate.

New England District.

Next south of the district of the St. Lawrence lies the somewhat related area of New England. This territory is tolerably well defined by geographic limits. The great tidal river or fiord of the Hudson, together with Lake George and Lake Champlain, which occupy the same valley and are only slightly divided from the Hudson, bound this area on the west. It is, moreover, separated from the body of the continent by the considerable mountain ranges of the Berkshire Hills, the Adirondacks, and the Green Mountains. In the region to the north of Vermont and New Hampshire the boundary between New England and Canada does not rest upon topographic features, but between the eastern border of New Hampshire and New Brunswick the boundary is more natural, lying in a range of hills and low mountains, which constitute the water-shed between the rivers of Maine and the drainage of the St. Lawrence. The line which divides New England on the east from New Brunswick is, again, of a rather unnatural kind, the two regions shading into each other along this political boundary.

Owing to the fact that it contains neither large islands nor extensive peninsulas, the New England district presents a more united surface than that about the Gulf of St. Lawrence. On account of the disposition of its mountains, and its considerable length in a north and south direction, and also because the Gulf Stream comes near to the shores in the region about Cape Cod, this field affords a range of climate unusual, in areas of similar size, in eastern North America. The portions of its surface which border on the Canada line have long and exceedingly cold winters, the summer season, or the period in which frosts do not occur, being not more than four months in length. On the other hand, in Cape Cod and the adjacent islands on the south of that promontory the thermometer rarely attains to zero on the Fahrenheit scale, and the frostless period of the year generally continues for at least six months. The belt of country next the Canada line is too cold to admit the profitable culture of Indian corn. The same is true of much of the upland district in the

Berkshire Hills and in the mountains of Vermont and New Hampshire, as well as in the eastern counties of Maine, next the New Brunswick line. In the other parts of New England all the grain crops which flourish in the Northern States of this Union may advantageously be reared. All the fruits of the country except those which require a subtropical climate, such as is found about the Gulf of Mexico or in southern California, will ripen over a large part of this field. The fitness of this part of the continent for a wide range of field and garden products is due to the fact that it has a very warm summer. The difference in this regard between the New England territory and that of the Laurentian district is, in the main, due to the fact that the waters which border the shore in the more southern land are much warmer than those which lie about the islands and peninsulas at the mouth of the St. Lawrence. The marine current setting southward from Baffin Bay gradually loses energy as it creeps down the coast. It is felt as far south as Cape Cod, but there its tide ceases to flow. South of that great promontory the waters are prevailingly warm; the relatively brief and mild weather does not usually serve to chill them below an average temperature of about fifty degrees above zero. They are rapidly warmed in the summer season, and maintain a relatively high temperature until late in the autumn. The result is, as is shown by the vegetation, that southeastern Massachusetts has the general climatal condition proper to the district as far south as southern Pennsylvania, a number of trees such as the tupelo and sassafras, which generally belong in the Middle States, flourishing in that district, as do also a number of the herbaceous and annual plants.

The soils of New England all have the character which is impressed upon the country where a glacier has recently done its peculiar work upon the surface. Throughout the area they consist of a more or less thick sheet of *débris*, the upper part of which has by admixture with decaying vegetation become suited for the growth of plants. There are two principal variations in the character of this detritus which greatly affect the nature of the soil. In one of these groups we find the coating to consist of a deposit known to geologists as till or bowlder-clay, a sheet-like mass often many feet in thickness, composed of commingled clay, sand, pebbles, and bowlders, all rudely mixed together. This deposit was left on the surface of the earth when the ice melted away, and so the fragments of rocky matter originally commingled together in the glacier were deposited, when it melted, in a con-

fused order. The soils formed upon this till-sheet, which covers probably three fourths or more of the New England field, though of a stubborn character and generally inconvenient of tillage because of the large bowlders which the mass contains, are nevertheless in almost all cases fairly fertile, and withstand the drain which agriculture puts upon them in a remarkably effective way. This endurance is due to the fact that the pebbles which the mass contains generally consist of materials which on their decay contribute substances which refresh the soil.

The character of these till or bowlder-clay soils depends much upon the nature of the rock whence the *débris* was derived. South of any large field occupied by rocks composed mainly or altogether of quartz, they are apt to be sterile, for the reason that the ice brought to the particular district and left upon the surface *débris* of this chemical nature. In general, however, the transportation of glacial waste has been from such a distance and the intermingling of material so perfect, that the bowlder-clay makes a fertile substratum for the fields. The result is that, though the New England farmer has to expend a great deal of labor in removing the stones, so that he may turn the earth with the plow, he thereby wins fields which, though they appear rude, are often of admirable fertility, and demand less care than generally is necessary to keep the ground fit for crops.

At the close of the Glacial period, when the ice was disappearing from the country, the waters which escaped from its front bore with them great quantities of sand and clay, the coarser part of this *débris*, mostly finely divided bits of quartz, being scattered over the surface in the form of extensive sand plains, the clay material being conveyed to the sea. The result is, that a considerable portion of New England is coated over by these sheets of arenaceous matter. Perhaps nearly one fourth of the area is occupied by these accumulations. Owing to the fact that the water in time of rain readily passes down to the depths of this porous covering, the soils of the sand plain are apt to be sterilized by drought. Only here and there, where the surface of the mass lies at such a low level with reference to the drainage that this downward percolation is hindered, are these soils fit for ordinary agriculture. Thus a large part of southeastern Massachusetts, including the greater part of Plymouth, Barnstable, Dukes, and Nantucket Counties, presents very extensive surfaces in the form of great plains which are easily tilled, but which are so liable to drought that they are left in their natural state. In this portion

of New England there are several hundred thousand acres of such land so worthless for agricultural purposes that it may be bought for less than a dollar an acre. In all, there is probably nearly a million acres of such sandy ground within the limits of New England which is fit only for timber culture. For this purpose it is in general well adapted.

Although the surface of New England is a tolerably united field, it presents a number of somewhat isolated areas which have characteristic features of sufficient physiographic value to affect the life of the people. In northern Maine lies the valley of the Holston River, the largest of the tributaries of the St. John. This valley, though situated near to the northern border of possible culture, is, owing to the nature of the rocks whence the glacial *débris* was derived, exceedingly fertile. It is too far north for maize, but the small grains and all the root crops are at their best in this field. Between the sources of the Holston and the Canadian line on the north, and the central portion of Maine, lies a noble pine forest, which, owing to the prevailing moisture of the climate, has been to a great extent saved from the destruction which fire has brought to these woods in the country between the eastern margin of New Hampshire and the western boundary of Michigan. This realm of Maine woods is the seat of numerous glacial lakes which are singularly linked together by natural channels; the soil, though prevailingly sandy, is admirably suited to the growth of the white pine and various other timber trees; this region bids fair to remain as a field of permanent woods, whence a great supply of construction timber will be delivered to the other parts of New England.

The shore-land district, extending from Eastport on the line between New Brunswick and the United States to Cape Ann in Massachasetts, is characterized by an exceedingly indented coast-line, the coast having the same fiord character as that in the Laurentian district, as well as the Scandinavian coast, the region where our race acquired its early training in the seafaring habit. So numerous are these bays and islands along this portion of the shore from Boston Bay to Passamaquoddy Bay, that while the shore, measured from headland to headland, is less than three hundred miles in length, the total coast-line at high tide extends for a distance of about three thousand miles. The waters of the inlets are deep, and the shore-land district, for an average distance of a hundred miles from the coast, is prevailingly fertile land. The result is that this coast presents a combination, rare in other

countries, of extraordinarily good harbors and excellent soil. The southern shore of New England, from Boston Bay to New York, is less well provided with harbors, and has a more meager soil next the shore. Both these disadvantages are due to the fact that this region is near the margin of the ice-sheet, and therefore receive on its surface a great body of washed sands, which to a great extent filled up the indentations in the bed-rock, which otherwise would have afforded good harbors, and spreading over the surface formed extensive sand plains, which, as we have before noted, provide indifferent soil.

The Connecticut Valley constitutes one of the most interesting geographic features of New England. This noble vale extends almost throughout the north and south expanse of New England. On its western border it is separated from the Hudson Valley by the wide and elevated district of the Berkshire Hills and the Green Mountains. Through the greater portion of its extent this ancient vale is remarkably wide and fertile. It was in the main originally a much larger trough, which has to a great extent been filled in by deposits formed since the beginning of the last ice epoch. These recent accumulations of *débris* in general afford a fertile soil. There are, indeed, few valleys in this country which contain lands better suited to a high grade of agriculture, or which have been made to yield a greater return of values, per unit of area, than the plains which border the Connecticut. Owing to its deeply recessed position in the elevated district of New England, this valley has a high summer temperature. On account of its north and south extent it is open to the polar winds, and is subjected to an intense winter cold. Nevertheless, the growing season is long enough to permit the development of all the Northern crops; even tobacco is successfully reared, and is, indeed, one of the most valuable products of this field.

The elevated district between the Connecticut and the Hudson Valleys has an average width of about sixty miles, and, though much intersected by the troughs of its various streams, has a surface prevailingly so high above the sea that it has a climate almost as cold during the growing season as that of the tillage belt along the St. Lawrence River. The greater portion of this district affords good soils, and is well suited to the nurture of all the Northern standard crops, except Indian corn. The climate is exceedingly favorable to the development of the people of our race, as well as to their associated domesticated animals.

Between the Connecticut Valley and the seaboard region lies

the broad ridge on which is situated some of the most attractive upland country of New England. This section extends from southern Connecticut to the middle district of New Hampshire. It is more or less diversified by the remnants of ancient mountains, such as Wachusett in Massachusetts and Monadnock in New Hampshire. The average height of this ridge at its crest is about twelve hundred feet above the sea. The whole of its expanse was in the olden day the seat of an extensive mountain chain, which has been worn down by the action of atmospheric decay, the erosive action of the rivers, and of successive glacial sheets, and from time to time by the assaults of sea-waves in periods when the ocean level lay higher against the land. This part of New England was among the first inland portions of this country to be occupied by European colonies. Two hundred years of experience have proved it to be a fertile and salubrious region, one of the best portions of the continent for the uses of man.

On the north of this great upland district, which for convenience we may term the Worcester field, from the city of that name, which lies high on its eastern versant, we find the great mountain district of New England, including the Franconia and White Mountain ranges. In this section we have an area of some thousands of square miles in extent, containing elevations of from five to six thousand feet in height, the highest point of which is Mount Washington, lying at six thousand two hundred feet above the sea. This elevated country is characterized by the presence of numerous valleys which the rivers have cut down to within about a thousand feet of the sea-level. In no other field in eastern North America are the mountainous slopes so steep or the valleys so profoundly excavated.

In the White Mountain district the steep character of the hillsides and the cold climate induced by the general elevation of the country in the main unfit the soil for tillage. It is, in fact, the largest part of the New England field which is unsuited for cultivation. On the other hand, it is a district admirably fitted to maintain valuable forests, and with proper care may afford a most important nursery for timber. Only the upper parts of the mountains, say above the height of four thousand feet, are so far sterilized by cold that our hardier coniferous trees can not attain to a vigorous growth.

As a whole, the climate and soil of New England insure to the people a tolerable immunity from the diseases which are to be attributed to these natural conditions. Until within the pres-

ent half century the whole of its area was exempt from the visitation of ague, that group of malarial fevers which has proved such a hindrance to the development of many parts of the country to the south and west of this district. Of late years, owing to some causes the nature of which is not well ascertained, malarial fever has somewhat afflicted the district of the Connecticut Valley and the lowlands along the Housatonic, and has spread along the shores of Connecticut, Rhode Island, and Massachusetts to the neighborhood of Boston. It seems not unlikely that the extension of this disease into New England has been due to the construction of a great number of reservoirs, in which the water is stored for the supply of power to mills. These reservoirs are filled during the winter season and drained in the summer and autumn. In these dry seasons the bottoms of these basins, being exposed to the sun, become admirable breeding-places for malarial germs.

Statistics show that the disease known as tuberculosis, which commonly manifests itself in consumption of the lungs, is more common in New England than in any other equal area within the United States. It is probable that the development of this malady is favored by the prevailingly humid climate and often wet soil in the more clayey portions of this district, especially those situated near the margins of the rivers and lakes. Experience has shown that contagious diseases, such as cholera and yellow fever, do not find a natural place for development in New England.

The prevailing wholesomeness of New England is doubtless in large measure to be attributed to the excellent nature of the sources whence the water used for domestic purposes may be obtained. Almost everywhere it is possible for the farm-house or the town to obtain admirable water, which may readily be kept free from all risk of pollution. No other part of the United States is in this regard so advantageously placed as is the New England district.

The mineral resources of New England consist mainly in its building-stone. In 1889, Massachusetts was first in the United States in the production of granite; Maine, second; Connecticut, fourth; Rhode Island, fifth; New Hampshire, seventh; Vermont, ninth. In marble, Vermont ranks first in the United States; Massachusetts, eighth. In slate, Vermont is second; Maine, third. These are of great variety, including a wide range of granitic materials, marbles, soapstones, and slates. The granitic rocks are

principally quarried along the Atlantic coast from eastern Maine to the western borders of Rhode Island; the marbles, in southern Vermont and in the Berkshire district of Massachusetts; the slates and soapstones, in this same district of uplands between the Connecticut and the Hudson. In southern Massachusetts, and in the portion of Rhode Island which borders on Narragansett Bay, there is a coal field having an area of about a thousand square miles. The coal of this district, though considerable in quantity, has not as yet proved important in the arts, and this on account of the great chemical changes which it has undergone. It is an extremely hard anthracite, which often in character approaches the substance known as graphite, a material which, as is well known, is of a very incombustible nature. It is likely that in the future this Narragansett coal will be made useful in the production of water-gas and in smelting ores. For both these uses it has certain chemical and physical features which give it a distinct value. For use in domestic fireplaces or for making steam experience shows that it is not fitted to compete with the coal from other parts of this country.

Iron has been successfully mined in various parts of New England, but in the present condition of the production of this metal it seems clear that none of the deposits in this district have any considerable economic value. Iron pyrite, which is much used in the production of sulphuric acid, is mined in the district bordering the Deerfield River in Massachusetts and in southern New Hampshire. Copper was once produced in considerable quantity from the mines at Ely, in Vermont; but the great decrease in the price of this metal, due to the development of mines in the district of Lake Superior and in the Cordilleras, has made its further production in New England for the time unprofitable.

The New England district has at present a remarkably varied population. The settlers during the colonial period were almost entirely from Great Britain and northern Ireland, and may be regarded as of pure British stock. During the great emigration of Protestants from France, a few Huguenots came to the Massachusetts colonies, but their settlement was soon scattered, and only a small part of the folk remained in New England. Perhaps the larger part of these British colonies were from the towns of Great Britain. Hence the early settlements were not generally made in the manner of scattered farmsteads, as in other parts of the country, but were prevailingly grouped in compact communities, from which the people went forth to the surrounding tilled

land. Until the middle of the present century the original character of the British population was essentially unchanged. Since that time, however, a very rapid immigration has set in from various parts of Europe and from the Canadian-French district of the Dominion. It should be noted, however, that, with the exception of a few thousand immigrants and their descendants from the Azores islands, all of whom are settled along the southern coast of Massachusetts, Rhode Island, and Connecticut, the population of New England of foreign origin has been derived from the northern portions of Europe.

In closing this sketch of the New England district we may note the fact that its surface has a more varied character than that of any other part of North America of equal area. It is likely that this diversity in physical condition will always maintain a considerable variety of the population as regards habits of life and the mental and physical peculiarities which arise therefrom.

Eastern Central States.

South and west of New England lies a group of States, consisting of New York, Pennsylvania, New Jersey, and Delaware, which for convenience, rather than on account of their geographic isolation, we may consider as one district. All these States have a share in the lowlands which border the Atlantic coast, and all except Delaware exhibit a considerable topographic variety, due to the fact that they lie in part upon the Appalachian Mountain system. The northern part of the field borders upon the St. Lawrence River, and thus comes near to the northern limits of the tillable district of the continent. Southern Pennsylvania borders upon the Virginia group of States, and except in the highlands has a winter rather less severe than that of southern New England. The Appalachian Mountain system extends from its northern termination in the region immediately west of Albany to its southern extremity in southern Pennsylvania, but it does not exhibit within this field anything like its extreme height. The greatest elevations connected with this system in this part of the country are found in the district of the Catskills, immediately west of the Hudson, where the higher peaks rise to about 4,000 feet above the sea. This Catskill elevation is not, indeed, in a proper sense to be considered mountainous, for the reason that the underlying rocks are not contorted, but lie nearly horizontally. The elevations are, in fact, hills which have been carved in the western table-land of the

range, the mountains proper being reduced to a few lowly ridges which lie between the margin of the Hudson River and the foot of the great range.

Passing to the north of the Catskills, the table-land of the Alleghanies rapidly declines in height, while the distinct folds altogether disappear, and along the line of the Mohawk River die out altogether. Just beyond the Mohawk to the north we find the great and peculiar mountain district of the Adirondacks, a system which was in existence long before the Alleghanies began to form, and which is, indeed, perhaps the oldest mountain range of the eastern United States. This ancient group of elevations occupies a field of somewhat circular shape. There are some scores of peaks in the Adirondack group the summits of which exceed three thousand feet in height. So ancient are these mountains, and so deeply worn down to their very roots by the erosive agents, that it is very difficult to determine anything concerning their original form or altitude.

Besides the foregoing strongly marked groups of elevations, we have in eastern Pennsylvania, western New Jersey, and the part of New York about the mouth of the Hudson, extending thence to the northern part of the eastern boundary of that State, a portion of the Blue Ridge, that ancient mountain chain which runs from northern Alabama to the White Mountains of New Hampshire. In Pennsylvania the Blue Ridge is of relatively trifling altitude, and is there known as the South Mountain. In western New Jersey they remain in the form of low but rugged elevations, and at the mouth of the Hudson they disappear, the river breaking its way across their line in the form of a very broad valley. In the Berkshire Hills this range again assumes the true mountain form, the summits attaining a height of three thousand feet or more, and having a very continuous face toward the Hudson Valley.

The result of these mountainous disturbances within this field is that rather more than one third of its area lies at an altitude of over a thousand feet above the level of the sea, and somewhere near one tenth attains an average elevation of two thousand feet. As the effect of elevating the surface of a country to the height of three hundred feet is about the same as that which would be brought about by moving the district sixty miles, or one degree to the northward, the result is that a considerable portion of the field we are considering has a rather cold climate. In the more elevated valleys of the Adirondacks, on the summit of the Catskill

table-land, and in the higher mountains of Pennsylvania, the winter is so long and the summer time so liable to frosts that the agricultural interests are limited. Only the hardier small grains, the forage crops, and potatoes can withstand the strenuous climate of these high-lying lands.

The low country along the Atlantic in eastern Pennsylvania, Delaware, and New Jersey is blessed with an admirable climate, which somewhat compensates for the rather infertile nature of the soil. It has long been, and bids fair to remain, one of the greatest fruit-producing regions in the northern part of the United States. The valley district of Pennsylvania, which lies between the South Mountain and the Alleghanies, is, like its continuation in the Shenandoah region of Virginia, a district of admirably fertile soils. The valley of the Hudson, like that of the neighboring Connecticut, is, as far as the lowland is concerned, an exceedingly fertile country, presenting, as is rare in eastern America, a sharp contrast between the admirable agriculture at the foot of the mountains on either side, and the sterile heights which lie above the plane of fertility. Passing from the Hudson Valley up the basin of its tributary, the Mohawk, we find the borderland of that stream to afford admirable soils, suited for the whole range of our Northern tillage products, and peculiarly well adapted to the growth of hops, a crop which does not generally flourish in the fields of North America.

At the head of the Mohawk we pass insensibly upon the great region of tolerably elevated plateaus which slope from the northern table-land of the Alleghanies toward Lake Erie, Lake Ontario, and the banks of the St. Lawrence. Although the greater part of this district lies at the height of nearly one thousand feet above the sea, and therefore has a colder climate than is desirable for the most of our field and garden plants, the exceeding fertility of the soil, and the tolerable immunity from summer frosts which is insured by the waters of the Great Lakes on the north, make it an admirable field for agriculture. It is doubtful, indeed, if any other equally extensive field in the United States affords such a good and enduring soil as is found in the district between the mouth of the Mohawk and the borders of the Great Lakes. This region of high-grade soils extends up the valleys of the streams which flow to the northward, so that the valley of the Genesee, as well as those in which lie the finger-like lakes of central New York, are prevailingly very fertile.

There is a considerable range in the excellent climate and

soil which much extends the fitness of this part of the country to produce a diversity of agricultural products. Along the Great Lakes, and generally in the plain country of northern New York, the soil is clayey and of a rather wet nature. The climate is also made somewhat more humid than it would otherwise be by the nearness of the district to those great fresh-water seas. The valleys in the southern part of the State have a drier climate, and the summers are sufficiently protracted to permit the profitable culture of the grape, which here yields an excellent quality of white wine.

Owing to the wide extension and prevailing great depth of the glacial detritus or drift in this part of the country, the rivers are maintained with a tolerably constant flow, and thus afford excellent water powers. They are, however, singularly ill-suited for navigation, only the Hudson—which is, in fact, not a river, but a fiordlike arm of the sea—having any considerable value as a way of communication. The unnavigable character of these streams is mainly due to the fact that they descend with considerable rapidity from elevated land to the sea level; the steepness of their fall, while it unfits them for the use of boats, adds to their value as sources of power.

In its primeval state the whole of this region, except a small portion of the higher mountain peaks, was occupied by dense forests which were rich in construction woods. These forests originally represented one of the noblest sections of the Appalachian woodland district. The upland areas, particularly in the northern portion of the country, abounded in the cone-bearing, narrow-leaved trees—the pines, firs, and hemlocks. The lower grounds were mostly possessed by the broad-leaved forms. Two centuries of use and abuse has reduced these forest lands to mere shreds of their original area. The only remnants which retain anything like the primeval character lie in the field of the Adirondacks and in the region about the head-waters of the Genesee, Susquehanna, and the Alleghany in the elevated table-land district of western Pennsylvania. This last-named district and the Adirondack wilderness, because of their cold climate, which makes them unsuited to agriculture, afford the natural nurseries of timber for the supply of this group of States.

The whole of this region exhibits a tolerable immunity from the diseases which depend upon the conditions of climate and soil. The naturally good water supply should insure exemption from the assault of most germ diseases, and the food-producing

capacity of the soil should ever insure the people against the evils of imperfect nutrition. In the northern and upland portion of this territory, owing to the length of the winters, the people are housed for a great part of the year. A proper care in the construction and ventilation of farm dwellings should, however, to a great extent remove the evils arising from winter housing, and thus make a great part of this field exceedingly salubrious. Along the lowlands of the Hudson valley and the seaboard district to the southward ordinary ague prevails. The disease, however, is not of a malignant type, and its assaults may generally be avoided by care as to the site of dwellings. Only limited portions of the country appear to be favorable to the development of the germs of this disease. These malarial places appear in general to be limited to fields where the soil is subjected to great alternations in the height of the ground water.

The mineral resources of this district are among the greatest of those found in any other equal area in this country. The production of salt in New York in 1889 was 11,365,039 bushels; in 1890, it was 12,660,182 bushels. (See, for other statistics, the chapter on Mineral Resources.) They include a wide range of products—coal, iron, nickel, salt, petroleum—and a number of other less important earth products, such as building stone, cements, and clays. The coal fields of this group of States are altogether limited to central and western Pennsylvania, where they occupy a territory of over twenty thousand square miles in extent, and are, on the whole, of better quality and occur in greater abundance for the area they underlie than in any other known part of the world. These Pennsylvania coals are divided into the two important groups of anthracite and bituminous. The anthracite basins, of which there are several, lie to the east of the ordinary carbonaceous deposits, and cover an aggregate area of about six hundred square miles. The beds are prevailingly thicker than is usual with coals, and, although they have been a good deal disturbed by the mountain-building forces, they are remarkably well placed for economic use. Although there are excellent anthracites in the Welsh district of England and in China, the deposits of Pennsylvania have alone been worked in an extensive way as sources of fuel supply. Owing to a singular conservatism in their arts, the British people have never learned to avail themselves of the peculiar qualities of this coal, which has the advantage of affording more available heat for a given weight

of material than any other form of combustible matter which is in a solid state.

The western bituminous coal field of Pennsylvania, which extends as far east as the upper waters of the Potomac and the Susquehanna, contains a total area of about twenty thousand square miles. Some of the beds in this field are among the best in the world, and, although the district of which these coals are but a fragment extends to the west and south far beyond the limits of Pennsylvania, it is doubtful if any equal area of coal-bearing strata in this country, or in any other part of the world, contains so great a store of mineral fuel.

In addition to its store of coal, the Pennsylvania district contains large deposits of petroleum and natural gas. The areas which have yielded petroleum in profitable quantities lie altogether in the extreme western portion of Pennsylvania, and are a part of the great field which is continued to the west and south in Ohio and West Virginia. Although the total amount of combustible matter of these rock oils is only a small fraction of that contained in the coals, the commercial value of their product is very great. With the exception of the Caspian field of Asia, no other district in the world has as yet shown anything like the capacity to afford the supply of petroleum which has been exhibited by the Pennsylvania district.

Besides the solid and the fluid fuels of this district, we find in western Pennsylvania and the neighboring portions of New York extensive areas where the rocks yield to borings large quantities of burnable gas. Within the last twenty years the rock gas of this district, and of the neighboring regions on the west and south, has found a large place in manufacturing industries and in domestic use. The evidence now in hand points to the conclusion that this source of fuel supply will not endure very long, but its effect on the economic history of this country has been very great, and it will probably not cease to be of commercial importance for some decades to come. As a whole, this district of the eastern central States may fairly be regarded as containing the largest and most varied stores of fuel fitted for use in domestic and manufacturing purposes that is known to exist in any part of the world.

The iron ores of this district are found over a considerable portion of the territory. In the valley of the Hudson, in the region immediately north of New York, there are extensive deposits of magnetic iron oxides. These ores are found also in the

Adirondack field, in northern New Jersey, and in eastern Pennsylvania. Farther to the west, in central Pennsylvania, there are considerable beds of less rich ores, which lie mostly in Silurian strata, and occupy a belt which extends from northern New York through Pennsylvania and the States to the south as far as Alabama. Until within thirty years the ores of the district we are now considering were the richest and most available of all those which were mined in North America. Recent discoveries in the region about Lake Superior and in the southern portion of the Appalachian district have disclosed far richer and more workable deposits, so that at present the iron deposits of Pennsylvania, New Jersey, and New York must be regarded as relatively inferior sources of supply.

In that part of New York which lies to the west of the Mohawk Valley we find a portion of the great salt field of North America, which is one of the most extensive saliferous regions of the world. The beds of this nature lie in the upper portion of the Silurian rocks, and consist of very thick strata of a crystalline salt of tolerably pure nature. In the region about Syracuse the brines derived from these rock salts are brought to the surface and evaporated by heat. At other points they are mined in the solid form by means of ordinary shafts and galleries.

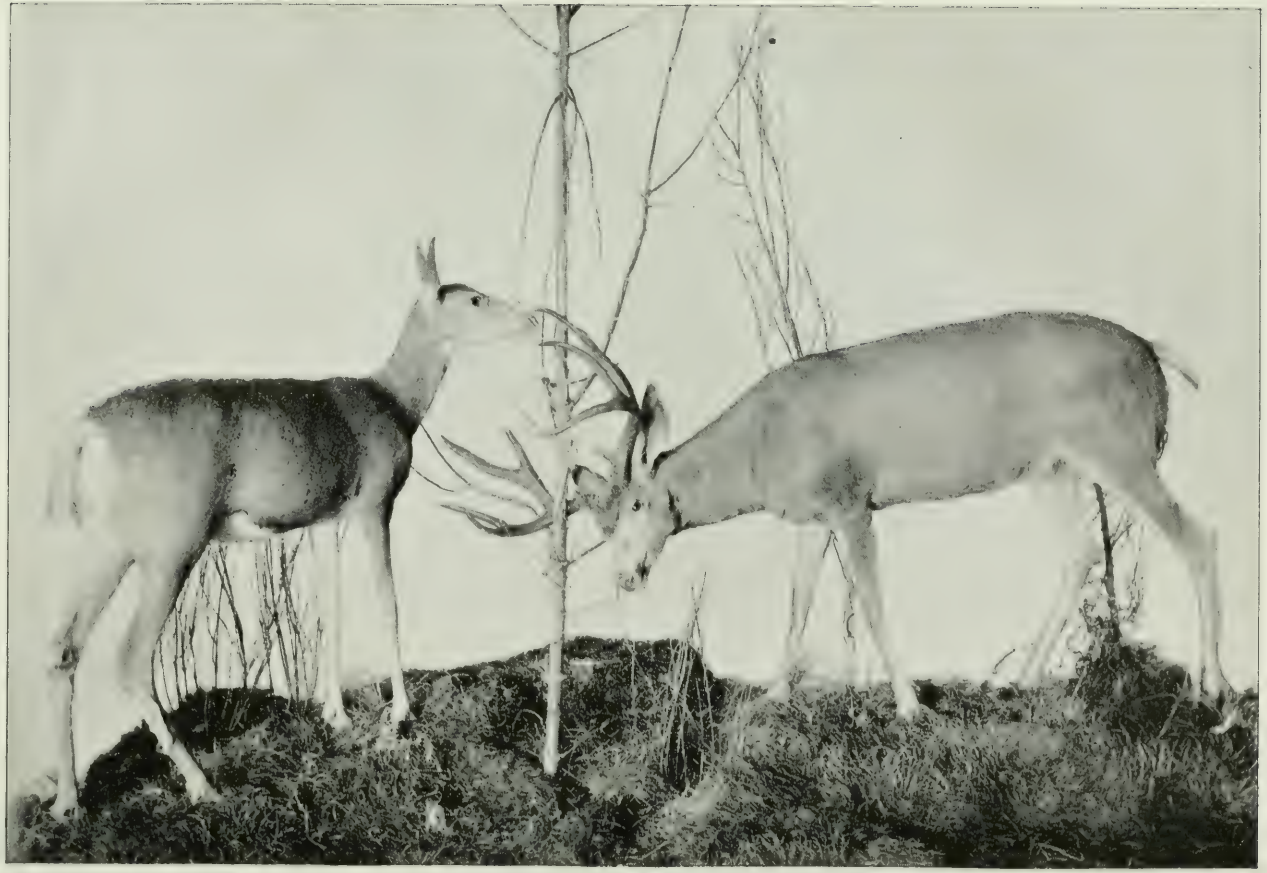
There are a number of minor mineral products which are mined in this district, among which we may mention zinc, nickel, and iron pyrites, but none of them are produced in sufficient quantities to have a considerable influence upon the industries of the people. The building-stone and other earth materials which serve in architecture are, however, of notable value. Eastern Pennsylvania and New Jersey are rich in building stone and slates, and the whole of the area, except some small fields where the thick coating of drift hides the firm-set rocks, affords stone suitable for ordinary uses.

The shore line of this district affords but one harbor of the first class—that of the port of New York. South of this point the coast is formed of rocks which readily break down under the action of the waves and tides, and hence the harbors are naturally rather shallow and unsuited to the use of the larger modern ships, except they be kept open by artificial contrivances. The mouth of the Hudson is not only the most southern of the rock ports of the Atlantic coast, but it has the peculiar advantage that the tide ebbs and flows in a channel which extends for about a

hundred miles inland, and hence the scouring action of the currents at its mouth is very powerful.

The original population of this part of the country was in the colonial times much more diverse than that which was contributed to any other equal area on this continent. The first settlers of New York were Hollanders; after them the Swedes made a considerable settlement in Delaware and New Jersey; and the Huguenots founded a colony on the Hudson. In the seventeenth century a large colony of Rhineland Germans was planted in central Pennsylvania. Eastern Pennsylvania was settled by one of the most peculiar body of English folk which ever came to this country, the immigrants who were led by William Penn. It is thus evident that, while New England was colonized by a homogeneous people united by language, religion, and the qualities of blood, this Eastern central district was from the beginning, in regard to population, very diversely conditioned.

Owing to the fact that New York has been the principal entry-port of immigration, especially that from continental Europe, and Philadelphia also the landing-place of many hundred thousand foreigners, the original diversity in the quality of the people has in modern times been increased. The result is, that at the present time this district contains the most heterogeneous body of folk which can be found anywhere in this country, or perhaps in the wide world. The people who inhabit it speak more than a score of distinct languages and dialects, at least one of which, the Pennsylvania German, has been maintained in use for nearly two hundred years, and has departed so far from the parent stock as to be almost incomprehensible to educated Germans from the native country. Although these foreign stocks have to a certain extent intermingled with the English folk, and all have been to a great extent affected by the social and political motives of the people who came from Great Britain, they still show a tendency to remain more or less isolated from each other. The Pennsylvania Germans are almost as distinct a people as they were when they came to this country. The Hollanders have only partially blended with their neighbors of English descent. The Irish and Germans of recent importation, especially where aggregated in cities, to a great extent keep apart from the other peoples. The result is, that in this section of the country the considerate observer may readily note a lack of coherence in the society, such as is shown in many other parts of the country where the folk are of one origin. The problem of the relation of these



A group of mule deer.

people from foreign countries with the English-speaking folk, who constitute the body of our population, is made the more serious by the fact that in this part of the country the immigrants appear to be of a lower grade than elsewhere. Very many of the incomers from abroad have been exported to the United States because they were unworthy members of the societies whence they came. Such refuse people rarely go far beyond the entry-port at which they arrive. Experience shows that neither from them nor from their descendants can we hope to secure valuable elements for our States.

While the race problem of this district is unquestionably of a serious nature, and seems likely much to affect the social and intellectual development of the field, we may look with confidence to the future of the district, which rests upon an assured foundation of admirable natural resources.

Virginia District.

The portion of the Atlantic seaboard and of the Appalachian highlands which is included in the States of Maryland, Virginia, North and South Carolina, is sufficiently individualized to admit of a common description. In this district we have a group of commonwealths, all of which, except Maryland, have a wide range of topographic reliefs; they all have a share of the lowland country, which on the north extends as far as New York Harbor, but which broadens as we go south, until finally it forms a great southern plain bordering upon the Gulf of Mexico. The territory of Maryland crosses the low Blue Ridge, which within its confines attains no great altitude and hardly has a mountainous aspect, and penetrates to the eastern border of the Alleghany Mountains. Virginia and the Carolinas include within their field the loftiest and most massive mountainous elevations which are found in eastern North America. Owing to this great diversity in the elevation of the surface, which ranges from the lowlands of the Atlantic shore to the height of between six and seven thousand feet in the mountainous districts, this region exhibits a greater variety of climatal conditions than is found in any other part of eastern North America beyond the limits of the tropics. Next the Atlantic coast, the broad belt of lowlands, somewhat sheltered in the winter season from the cold continental winds by the Appalachian highlands, has a relatively warm climate. Although occasionally exposed to a low temperature, the periods of frost are very discontinuous; the

spring-time ordinarily manifests itself, even in the northern part of this lowland, as early as the middle of February, and killing frosts rarely occur before the first of December. In the southern portion of this district, from the region just south of New Berne, N. C., southward, the palmetto, a species of palm, occurs near the shore, giving the country a somewhat tropical aspect. The summers of this shore-land belt are exceedingly hot and generally moist, so that a wide range of plants may be reared. Rice is successfully grown as far north as the region near Norfolk, and all the other grains which are reared in this country succeed tolerably well. Certain of the subtropical fruits, such as oranges and lemons, may be grown in the open air as far north as Charleston, and the fig thrives as far north as North Carolina. The whole of this belt to the south of the James has the protracted growing season which is suited to the cultivation of cotton; and along the coast of South Carolina, and the low islands which range its shore, this plant produces the longest and most valuable fiber which is found in this country.

The lowlands of this district rise gently from the level of the sea at the rate of from five to ten feet to the mile as we go westward; next the shore the surface is so flat that much of the area, probably in all not far from ten thousand square miles of surface, is occupied by swamps, all of which are above the level of the sea, the water being retained upon them by the dense growth of reeds and other crowded vegetation; the dense mat of stems and leaves serves to retain the water on the surface and convert the area into very wet land, which may, however, readily be won to the uses of agriculture.

In the northern part of this great plain land there are many re-entrants of the sea, termed bays, of which the many-armed Chesapeake Bay is the most conspicuous. Albemarle and Pamlico Sounds are of the same nature, and several similar indentations exist farther south. These indentations appear to be due to the fact that in recent times the shores stood at a higher level than at present, during which period the valleys in which the bays now lie were excavated. When the shore sank down, the sea flooded a great part of the river basin. With the exception of the main waters of Chesapeake Bay these great embayments rarely afford sufficient water for the larger modern craft, but they are admirably suited to the use of small coasting vessels; their waters abound in fish and oysters, and thus serve to maintain a large maritime population.

Gradually rising from the seashore, the southern plain at length merges on its western border in the hill country lying on the eastern side of the great Blue Ridge Mountain range. This elevated region between the high mountains on the west and the coastal plain is commonly known as the "Piedmont District." It is a characteristic feature in the topography of the States we are now considering, and it affords in many ways the fairest lands contained within that area. The general surface of the Piedmont District lies at an altitude of from five hundred to one thousand feet above the level of the sea. It is fairly well protected from the bitter winter winds which arise in the interior of the continent, and the cold is, moreover, tempered by the neighborhood of the warm Atlantic. Save for the narrow strip along the Pacific coast, no portion of North America to the north of the tropics possesses a climate which so well escapes the extreme heat of summer and the excessive colds of winter.

Notwithstanding their southern position, the mountainous fields of the Blue Ridge, owing to their great elevation, are subjected to a cold climate. The winter endures for about the same length of time that it does in New England, but, owing to the southern position, the higher range of the sun causes the winter frosts to be much less severe. Although in the summer the sun becomes nearly vertical and the days are hot, the height of the region causes the nights to be cool, and so the fervent heat of the lowlands on the west and south of this area is entirely escaped. On account of the beauty of its scenery, which has all the grace that mountain, forest, and stream can give to a landscape, this upland country of the Blue Ridge is fairly to be reckoned as the most charming part of the United States. Except it may be in the mountains of the larger islands of the Caribbean or the upland region of southern Mexico, no part of the continent can vie with it in beauty.

West of the Blue Ridge lies the great valley which separates that old mountain axis from the newer elevations of the Alleghany range. In Maryland this mountain trough is indistinct, because of the low nature of its eastern boundary, but in Virginia, in the noble valley of the Shenandoah, it is a majestic feature in the architecture of the country. On either side it is bounded by high walls, and it is itself divided by ridges, one of which at least—the Massanutten range—is of truly mountainous aspect. The greater portion of the surface, however, has the form of broad, rolling plains and low hills, which are often tillable

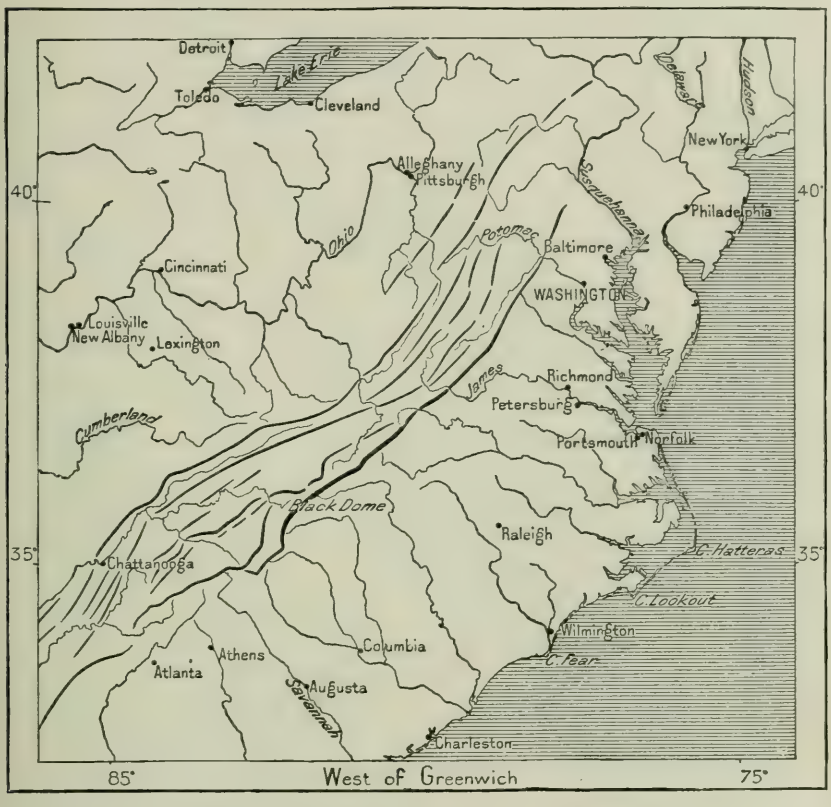
to their tops. The floor of this valley has an elevation of from five hundred to two thousand feet above the sea. On the south it passes rather indistinctly over broad divides into its southern continuation in the valley of the New River and of the waters of the upper Tennessee. From the point of view of human interests, this broad vale between the Blue Ridge and the Alleghanies is perhaps the noblest tract in the Appalachian Mountain district. It has a magnificent climate; the winters are cold enough to have a tonic effect upon the population, and the summers are long and only of moderate heat. There is perhaps no other area in the United States where as wide a range of field and garden crops will flourish with the same luxuriance as here.

West of the great valley in Virginia and Maryland lie the relatively new mountains of the Alleghany range. This part of the country is cast into long, regular mountainous folds, the main axes of which extend in a prevailing north and south direction. The summits of these continuous crests attain in general to a height of from two to four thousand feet above the sea. They are thus within the field of a rather cold climate. This mountain district of the Alleghanies is a country of rude surface, the valleys are rather narrow, and the land, on the whole, notwithstanding the existence of many rich valleys, is relatively infertile. It gives less promise for the future use of man, at least as far as the soil is concerned, than any other part of the Virginia district.

Unlike the New England and the New York group of States, the area we are now considering lies almost altogether to the south of the district occupied by the ice-sheet which in the geological yesterday was imposed upon the northern part of the continent. The result is, that the soils of this area are much more varied than those in the region to the northward. There they depend for their substratum on the materials derived from a variety of rocks which have been commingled by glacial action. Thus, in this district as elsewhere south of the glacial belt, the local variations in the quality of the soil are very great, as is also the range in their fertility.

The plain region next the coast has its surface in general covered with sands which were brought into their position when the area in recent geological time lay below the level of the sea. These shore-lands have rather light soils, which are not enduring to the tax of agriculture, and which to a great extent have had their natural resources much wasted by a careless system of tillage. Where the land was originally occupied by swamps,

which have been cleared away by the simple drainage system which they require to make them fit for the plow, the soil is found to be of great and enduring fertility. In fact, the best land by far of all this plain district has not been brought to the uses of man.



Scale 1 : 11,000,000. ——— 186 miles.

Axes of the Appalachian System south of the Susquehanna.

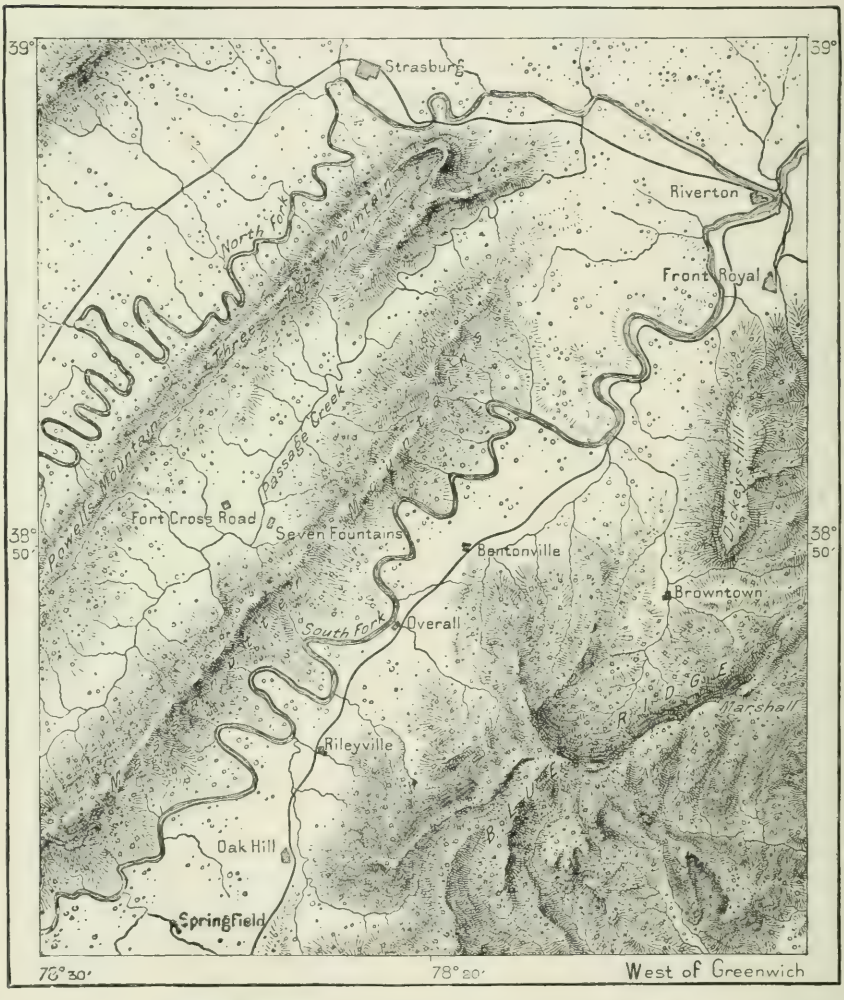
It is still covered with cane and the other plants which form the water-containing mat of the swamp. These morasses constitute the most important land reserve of this area, and from them in time will be won more fertile fields than any which existed in the primeval state of the soil.

It is a fortunate feature with these lowland soils that the underlying rocks at many points contains marls which are well fitted to enrich the exhausted fields.

Besides the fresh-water swamps, the marine marshes of this shore-land district, which are extensive, are to a great extent fit

for the uses of agriculture. In the present economic condition of the country they can not be so used; but when the region becomes the seat of a dense population, when, in a word, the state of the country is such as has existed for a century in Holland, these marshes will be drained and will afford admirable soil.

The geological resources of this district are great and varied.



Scale 1 : 325,000. 6 miles.

A part of the Shenandoah Valley.

The stores of mineral fuel are limited to bituminous coal. There are a few thin beds of a somewhat anthracitic nature in the moun-

Dismal Swamp, North Carolina, showing swamp cypress and cypress knees.

tains on the western side of the Shenandoah Valley, but they have at present no economic value. The most important bodies of bituminous coal within the limits of the five States we are now considering are confined to the southeastern part of Virginia, where, over a considerable area, they are of an admirable quality, and, like the best of those in Pennsylvania, West Virginia, and Kentucky, remarkably well suited for the production of coke which is to be used in iron smelting. These Virginia coals are of peculiar value for the reason that they are, of all the good coking coals, the nearest to the seaports of the south Atlantic. The best of the beds are ten feet or more thick, and afford conditions under which mining can be done with a less expenditure of labor than in any other coal field which is now operated in the world. Besides these high-grade bituminous coals, which are situated on the western flank of the Alleghany Mountains, and are thus remote from the sea, there are several small coal basins formed in a stage of the earth's history immediately after the Carboniferous period which lie close to tide water. In parts these basins are situated near the Dan River in North Carolina, but the only one of value lies to the south and west of Richmond, Virginia. In this James River coal field the deposits are of a fair burnable quality; they have long been used as a source of supply for the immediate neighborhood, but they are, unfortunately, not well suited for mining. The beds are very much broken up by mountain-building disturbances—the faults and foldings to which compressed rocks are subjected; here and there they are altered by the injection of volcanic materials, and the coal itself is remarkably full of gas, which readily inflames, in consequence of which the mines are liable to terrible explosions. With a proper system of mining, such as has never been undertaken in this district, it seems likely that the coal measures of the Richmond field may be made to yield a large quantity of valuable fuel.

The iron ores of the Virginia district consist principally of bedded deposits lying mainly in strata of Cambrian age. This series of iron ores occupies a belt along the eastern side of the Shenandoah Valley and its continuation to the southward. The deposits appear in the foot-hills of the Blue Ridge. The accumulations of ore are of variable thickness, but usually of great depth. In the northern part of the field they are generally rather siliceous, but southward they become better suited for the manufacture of iron. At many points they contain too much manganese for the manufacture of foundry iron, but owing to the prevailing low per-

centage of phosphorus they make a metal of excellent strength, well suited to all forging work. On the western side of the Shenandoah Valley, in beds of Upper Silurian and Lower Devonian age, lie other bedded ores of less thickness than those which have just been described, but which afford iron of excellent quality. These two contrasted sets of iron-ore deposits follow the broad valley of the central Appalachian district from the Potomac southward to Tennessee, and, as we shall note hereafter, the same arrangement of strata-bearing ores extends as far southward as Alabama. In western North Carolina, especially at the mines at Cranberry, there are considerable accumulations of magnetic iron oxide, a high-grade ore which is not known to exist elsewhere in workable quantities in the Southern States. These deposits of magnetite, though of some extent, are as yet of uncertain value, for the reason that at some points the iron oxide is mingled with such quantities of other minerals that it is difficult to prepare an ore of fit quality for use. At other places the higher ores contain such an amount of the metal known as titanium that it can not be profitably smelted.

The other metals of this district which have at present a commercial importance are: manganese, which has been extensively mined on the western flank of the Blue Ridge between the Chesapeake and Ohio Railway and the Potomac; zinc, the ores of which exist in considerable quantity in southwestern Virginia; tin, which occurs in as yet unknown quantities in the head-waters of Irish Creek, a tributary of the James, which descends from the western flank of the mountains a little south of Rockfish Gap; and iron pyrites, which are produced in considerable quantities from mines on the eastern slope of the Blue Ridge in Virginia. Although these metalliferous ores are of only secondary importance with reference to the future economies of the district, they are likely to play a somewhat important part in its industrial development. At various points in the Blue Ridge deposits of copper occur. For a time in northern central North Carolina this metal was produced at a profit, but the recent decline in the price has apparently made it unremunerative to work the deposits.

From about the beginning of the present century to the year 1860 the Piedmont districts of Virginia, the Carolinas, and Georgia were the seat of considerable gold mining, the precious metal being won both from placer deposits and from underground working. Many of these mines proved very profitable, and the

total value of the gold marketed during this period probably amounted to $20,000,000. Since the abolition of slavery many of the old workings have been reopened, and at other points new mines have been dug, but with rare exceptions all these undertakings have proved unprofitable, and the few which have escaped financial ruin have attained no conspicuous success. The failure of all these efforts to win gold from this district since the civil war is probably due to the change in the condition of the laboring people of the country. Of old, the cotton-planters, in the season when the men were not occupied in tilling their single crop, could detach their slaves for service in the mines. Over a large part of the field it was possible for men, as it is indeed at the present day, to win a dollar's worth of gold for each day of labor. As the cost of clothing and subsisting the negroes was less than half this amount, the mines could be worked with profit, while at the present time, with labor which costs at least a dollar and a half per diem, the works can not be made to pay expenses.

As the rainfall of this region on the average exceeds sixty inches per annum, it naturally abounds in large rivers. No other equal area on this continent contains as numerous streams of considerable flow. These rivers are, however, subjected to relatively great variation in the amount of water they convey at different seasons. As long as the forest coating remains in its original state, the downward course of the waters is somewhat hindered by the deep mat of decaying vegetation; but as the woods are cleared away and the land brought into the tilled state, floods become continually more destructive.

As regards the healthfulness of the Virginia district, it may be said that as a whole it is remarkably exempt from serious maladies. The belt of land next the shore in which morasses abound is subjected to malarial fevers which are usually not of a malignant character. Experience has shown that this coast section is liable to the invasion of yellow fever; some very destructive epidemics of this plague have ravaged the larger towns of the coast line.

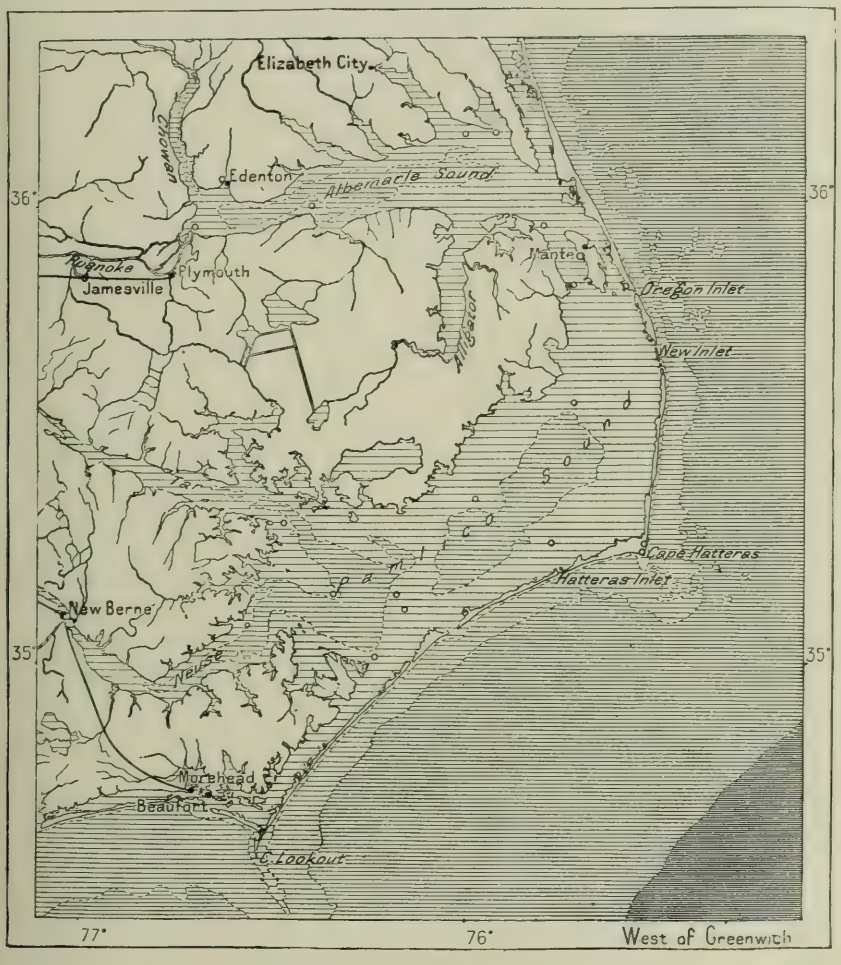
The population of the Virginia district, as regards the sources of its origin, presents a singular variety of peoples. The first settlers of the Commonwealth of Virginia and of Maryland were of pure British stock derived from England, Scotland, and north Ireland. The Irish element of the colonies was almost entirely descended from British settlers in that island. These early settlers of Maryland and Virginia were mainly from the rural dis-

tricts of the mother country, and were among the most vigorous and enterprising of those who came to America in the first half of the seventeenth century. The first settlers of North Carolina, who occupied the coast district along the shores of Albemarle and Pamlico Sounds, were in part derived from the Rhineland district of Europe. They were brought to this country by a land company which owned the seacoast portion of North Carolina. A portion of the settlers of this Albemarle district were Germans and Swiss, who had been driven from their homes by the French on account of their Protestant faith. They were brought to this country by contractors, who undertook to colonize the district in the interests of the corporation which owned the territory. Although in many regards an estimable people, they lacked the energy which is necessary in undertaking the arduous tasks of colonists. Experience shows that, to be successful in a new country, immigrants must come to it altogether inspired by a desire to better their conditions. If their emigration is forced, or even greatly favored by the action of others, they rarely succeed in founding a colony of a vigorous and enterprising character. It is therefore perhaps not surprising that the immigrants of eastern North Carolina were among the most unsuccessful colonists within the limits of the Virginia district. Their descendants have remained upon the land, but neither in the colonial nor the later days of the country have they shown any considerable vigor of mind or body. The difference between these people and those who settled in the tide-water district of Virginia has always been very great. It may be measured by the fact that, while the folk from the district about Chesapeake Bay have produced at least fifty men of national fame, no man of general note has been developed from the people who first settled in the lowland area of North Carolina.

In South Carolina, the first settlers who occupied the shore of that State and the neighboring district of Georgia were derived in part from Britain and in part from the expatriated Protestants of France, commonly known as Huguenots. Both these divisions of the settlers on this portion of the shore were of admirable character. The French blood in particular has exhibited in this district, as elsewhere, a singularly good admixture of qualities; energy, thrift, and a spirit of culture appear to be almost inevitably associated with Huguenot blood. The descendants of these remarkable people, in the South Carolina district at least, have preserved by intermarriage the purity of the original stock in

House of negro family in Florida.

such a measure that their French quality is still distinctly traceable. From their admixture with those of English descent has



North Carolina sandbanks.

arisen a body of people in the region about Charleston which is somewhat sharply differentiated from the other folk of the Atlantic coast line.

After the settlement of the Virginia district, during the first

half of the eighteenth century, there came into the country a great tide of immigration from Scotland and north Ireland. The exodus of this people from their native country was brought about by the rebellions in favor of the Stuart pretenders to the throne of Great Britain and Ireland. To a great extent these Scotch immigrants occupied the Piedmont district of Virginia and the Carolinas. This second group of colonists have proved a valuable addition to the population of this district. From their descendants came in large measure the warlike folk which founded the first settlements in Kentucky and Tennessee. Another element of the white population of the Virginia district has been derived from the Pennsylvania Germans, who settled just west of the colony of William Penn in the beginning of the eighteenth century. These American-born Rhinelanders have extended south of the Potomac, and have occupied a considerable portion of the Shenandoah Valley. This Teutonic population was somewhat re-enforced during the Revolutionary War by Hessians who surrendered at Saratoga.

The proportion of negro population of the Virginia district increases in a tolerably steadfast ratio as we proceed southwardly from the Maryland line to the southern portion of South Carolina and the neighboring parts of Georgia. It is, however, limited in good part to the low-lying shore-lands and to the Piedmont portion of the country. It is almost absent in the highland parts of the interior. In the Blue Ridge and Appalachian country at higher levels than a thousand feet above the sea, the African element is comparatively insignificant in amount. The fact seems to be that the negro, although flourishing exceedingly in the lowlands next the coast, does not find the higher country suitable to his development.

Although there was some negro element in the population of the colonies both to the north and south of the Virginia district, the lowland and Piedmont section of this part of the continent may fairly be regarded as the original seat of the American African. From this part of the Atlantic coast line came the greater portion of the blacks who were settled in the latter part of the last century and the first half of this in the slaveholding States of the Mississippi Valley and the region about the Gulf of Mexico. Almost all the importations of African slaves came to the shore between the mouth of the Savannah River and the northern parts of Chesapeake Bay. The importation of Africans into Maryland and Virginia practically ceased more than a cen-

tury ago, and for about the last hundred years during which slaveholding endured, the region north of North Carolina was largely engaged in selling the surplus negro population to the inland Southern States. This traffic resulted in a remarkable improvement in the quality of the Africans in this section. As the masters in succession parted with their slaves to the negro-traders they naturally chose for sale the least attractive of their servants, by preference disposing of the least favored members of the race. Through this process of selection, by which the more intelligent and amiable blacks were retained on the ground, the African blood of this district has been brought to a higher level than in any other part of the country.

As a whole, the Virginia district, except for the large African element of its population, may be regarded as peculiarly fortunate as regards the quality of its people. The whites are of a purer English stock than those of any other part of the country, save, it may be, in the case of their descendants in Kentucky, Tennessee, and the adjacent States on the south. The trials of the civil war showed clearly that the English folk in this district have lost nothing of their vigor in the century or more of their residence in this part of the continent. It might, indeed, with reason be claimed that the race has gained in all its valuable qualities since it came to dwell within this field.

The coast-land region of the Virginia district, with its gradual rise in the surface of the country from the seashore to the mountainous elevations of the Appalachians, continues through Georgia as far south as the northern portion of Florida. We there enter upon a district embraced within a great peninsula which is in many regards sharply contrasted with the other parts of the area occupied by the Atlantic States. On account of its peculiarities we shall consider this district under a separate heading.

Florida District.

The peninsula of Florida constitutes one of the most individualized portions of the North American continent. In a general way it may be described as the summit of a vast ridge which rises from the floor of the Gulf of Mexico until it attains a level not exceeding about three hundred feet above the sea, thence declining rather more steeply than on the Gulf side to the bottom of the channel which separates Florida from the Bahamas. The portion of this great arch which lies above the sea-level is relatively small; by far the greater portion of its area is covered by

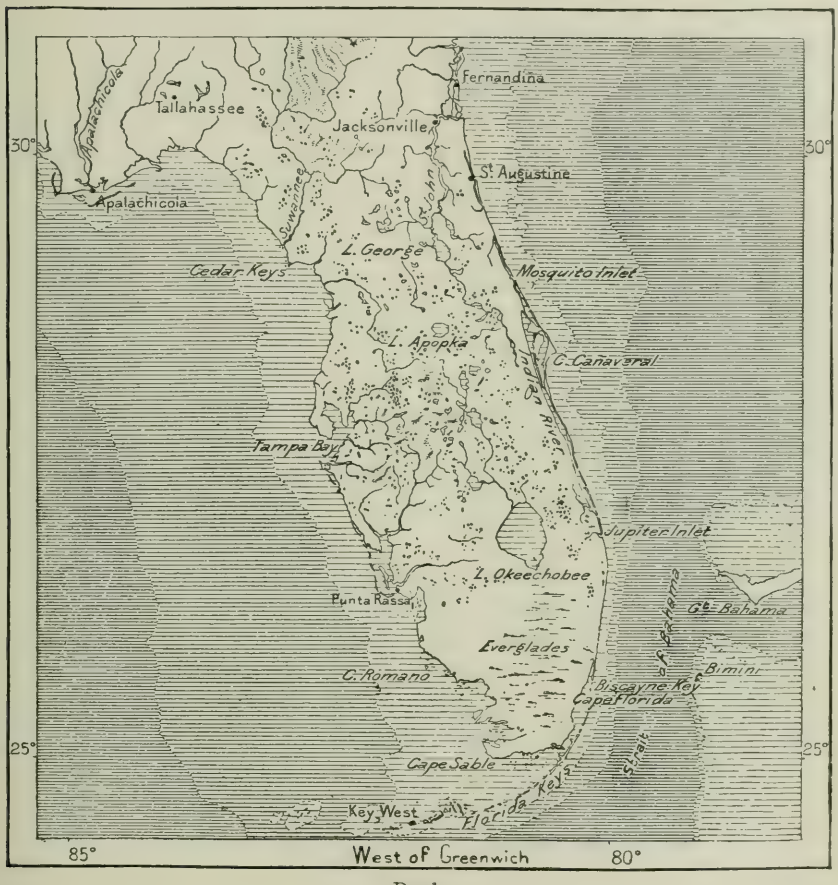
the waters of the sea. Less than a tenth of its total elevation is above the plain of the ocean.

Glancing at a map of North America, the reader will at once observe that the peninsula of Florida trends in a direction which is sharply contrasted with that followed by the other great peninsulas of the eastern side of the continent, and that the ridge of which the land itself is the summit has its axis turned at nearly right angles to the direction of the Appalachian Mountains. The total length of Florida is about five hundred miles, and its average width but little exceeds one hundred miles. Nearly one half the peninsula lies at a height of less than fifty feet above the surface of the sea. A depression of one hundred feet would limit the area of dry land to a relatively small field in the central and northern portions of the peninsula.

Owing to its extreme southern position, and to the fact that it is bathed on the east, south, and west by warm waters, and owing also to the slight elevation of its surface, Florida has an almost tropical climate. In all the more important climatal features there is less difference exhibited in this area than in any other field of equal dimensions and north and south extension on the continent. On the northern end of the peninsula the winter season frequently brings frosts of considerable severity. Rarely, however, does the temperature fall more than a few degrees below the freezing point. Farther to the south, in the central portion of the narrow land, where the climate is more affected by the neighboring seas, the freezing temperature is only attained in occasional winters of unusual severity. The extreme southern part of the peninsula and the low coral reef islands which fringe its southern and southeastern border are almost exempt from frost. A man may in a lifetime never see ice or snow on this portion of the coast-line. The summer season of this district endures for about three fourths of the year. Owing, however, to the influence of the neighboring seas the heat, though continuous, is never as great as it is on occasional days in districts several hundred miles farther north. The range of temperature within the limits of the peninsula is not much more than half that which occurs along the banks of the St. Lawrence in ordinary years.

The southern portion of Florida, from Lake Kissimmee southward, is an extremely low-lying land, the highest points rising not more than about twenty feet above the sea. Nearly the whole of this section of the State consists of swamps, with here and there hummocks or ridges which rise a few feet above the level of the

annual inundations. In the rainy season of the later summer and autumn this portion of the peninsula is a vast swampy lake, which may be traversed in almost any direction by means of canoes or other light boats.



Peninsula of Florida.

The soil of southern Florida is peculiar, in that it is of a very limy nature, which is due to the fact that the materials composing the superficial rocks of the district were formed by coral animals, which built the reefs, and by various other limestone-secreting creatures which dwelt in the sea along with the reef-

builders. The peculiar origin of the rocks which have formed the soils of southern Florida causes them to be more limy than those of any other part of the shore-land district of North America. They also abound in phosphates, potash, and soda, and thus they are exceedingly well fitted for the growth of certain crops.

North of Lake Kissimmee the great part of the surface is occupied by fine siliceous sands, which were drifted into this district when in recent times it lay below the level of the sea. Near the shores these sandy districts are in the form of broad, rolling plains, which, as regards their surface contours, are essentially like the coast plain which stretches to the northward as far as New Jersey. As we advance from the shore of the peninsula toward the interior the surface becomes more and more rolling, and in the central portion of the area the sand ridges take on the form of sharp elevations, between which are inclosed a great number of lakes, varying from little dots of water to basins of fifty or more square miles in extent. Owing to the moist climate and low relief of this surface contained within the Florida Peninsula every depression is occupied by a lake or a swamp. Except in the northernmost part of the country, there is no continuous area of land which is not in part covered by water during the rainy season.

Although the dry land of Florida is, on the whole, of rather an infertile nature, the peninsula in general may be regarded as a region of great agricultural possibilities. Even the most sterile part of the sandy district, which in its natural state will barely support a scanty vegetation, and often presents a surface of nearly barren sand, will with a slight amount of artificial manuring yield abundant returns of fruits and vegetables. The fact is, the humidity of the climate and the prevalence of sunshine, along with the high temperature, have a remarkably stimulating effect on the growth of vegetation. The plants develop with such energy under these conditions of heat, sunlight, and humidity that they profit by all the sustenance which the soil affords.

The swamp lands of Florida, which occupy an area of about twenty-eight thousand square miles within the limits of the State, have not yet begun to be used for tillage. This vast area of more than seventeen million acres will when drained be fit for agriculture; probably nine tenths of the surface will in time, by simple engineering devices, be converted into fertile fields. When thus subjugated these inundated lands will be found extremely rich and enduring to the tax to which crops subject the earth.

Packing sponges, Bahama Islands.

The forests of Florida are of an extremely varied nature. On the southern shore, including the belt of the mainland from near Jupiter Inlet to the southern extremity of the peninsula, as well as the Keys or elevated coral reefs which fringe this part of the coast, the vegetation is of an essentially tropical character. More than twenty species of tropical trees flourish along this part of the coast, and much of the lesser vegetation has an equatorial aspect. Certain of these plants—as, for instance, the mangrove—extend up the eastern coast nearly as far north as St. Augustine.

The whole of the upland soils of the State, as well as the drier parts of the swamps which here and there have been used for agriculture, are admirably suited to the growth of a great variety of tropical and subtropical fruits. In the district of the Keys, and along the eastern coast of the peninsula as far north as Jupiter Inlet, the pineapple flourishes, attaining a vigorous growth and producing excellent fruit. So sturdy is the plant, that when the burrs from which it is propagated are inserted in a crevice of the coral rocks the plants will attain their full development. The cocoanut palm develops as far north as Lake Worth, though its growth in that district is somewhat stunted. Along the shore as far as Cape Florida it attains tropical dimensions. From Cape Florida northward to the region about Jacksonville and west to the district about Tampa the orange and the lemon find a suitable field for their development. Central Florida as far south as Lake Kissimmee produces admirable fruit of these species, and the country along Indian River from Jupiter Inlet to near St. Augustine is perhaps the best orange district in the world both for the amount of fruit which can be obtained and the quality of the product. Occasional frosts damage the crop in the northern portion of this district, but over the larger part of the area the groves are practically exempt from such visitations. Although the citrus fruits flourish throughout a large part of California, and can be successfully grown in southern Arizona and New Mexico, there is no other extensive field in the United States where they can be so economically cultivated as in the peninsula of Florida. In the western portion of the United States it is usually necessary to irrigate the ground for the culture of these species, while in Florida the rainfall supplies abundant moisture for the plants.

On the western side of the peninsula, occupying an area of as yet unknown extent, lie vast fields underlaid by rock composed in the main of lime phosphate. It seems likely that this important territory contains an area of several hundred square miles,

and that the store of this valuable fertilizer is sufficient to supply the demand of this country for centuries to come. As these deposits have been known for but a brief time, it is not yet possible to determine their precise value and their probable relation to the export trade with Europe. It seems, however, likely that they will afford a basis for a very extended export trade, as well as for a great domestic commerce. There can be no doubt that, for the economic future of the peninsula, these resources are of more value than any stores of a metalliferous sort which could ever have been accumulated in rocks such as underlie this part of the country.

The water supply of Florida is affected by certain curious conditions. Where the surface is underlaid by limestone rocks, streams course in underground channels and break forth in large springs, which often form at once rivers of considerable flow. In other cases, at least in the northern part of the peninsula, the land water passes in these cavernous channels to points beneath the sea, and there wells upward to the surface in great springs, which flow with such vigor that a boat is swept away from the center of the disk formed by the ascending fresh water on the surface of the sea. Such a submarine spring is known off the shore near St. Augustine, and several others occur on the western coast of the peninsula. Where the rain water falls upon the porous sands it penetrates through the interstices of the mass to a great depth. In this regard its action is much the same as that which we have noticed as occurring in the stratified sands of glacial origin, such as those which are exhibited in southeastern New England and elsewhere in the region occupied by the ice during the last Glacial epoch. The result of this combined porosity of the sand and the cavernous nature of the limestone rock is that Florida has but few true rivers. The great channel of the St. John's in the northern part of the State is to a considerable extent an arm of the sea. The free-flowing rivers bear little relation to the amount of rain which falls within the region.

The lagoons and streams of Florida, especially where the water is brackish, abound in fish, and the shoals about the shores also afford a great variety of edible forms. Probably no portion of the American coast so far abounds in species of this group which are useful to man. Up to the present time the fishing-grounds of Florida have been little used as sources of food for regions beyond the peninsula. The climate is unfavorable for preserving the harvest of these animals. It is probable, how-

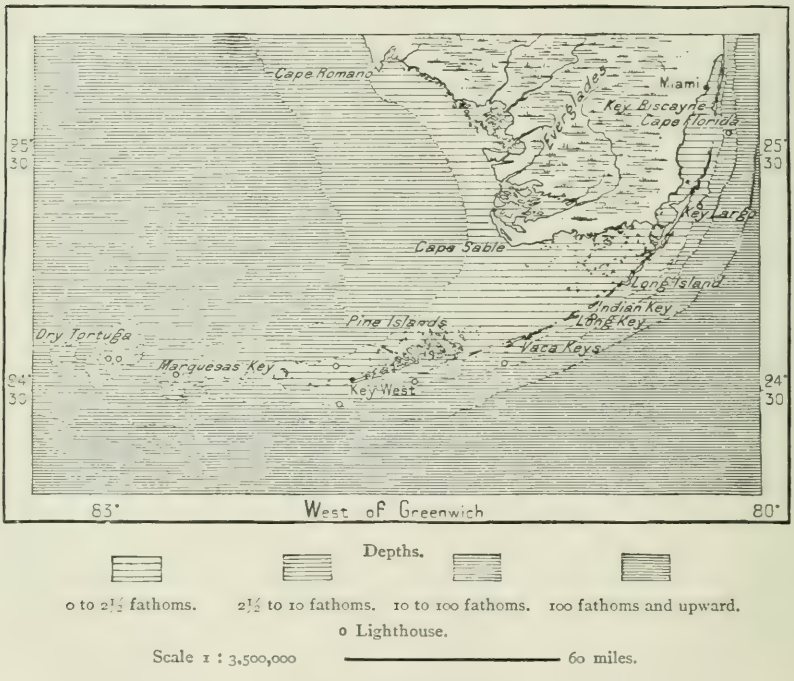
ever, that in the future the various artificial processes of freezing which now can be applied on shipboard will make the admirable fisheries of this district more valuable than they are at present. The shores of Florida south of St. Augustine are much resorted to by the green turtle, and at many points they are caught in great quantities. Owing, however, to the reckless destruction of their eggs by the whites and Indians, as well as by the bears and other wild animals, there is danger that this valuable creature may be expelled from this region.

Owing to its moist climate and high temperature, the whole of the Florida Peninsula is, during the protracted summer season, subjected to malarial fevers, which are most serious in the interior district, the immediate seaboard, especially the strips of land between the salt-water lagoons and the open ocean, being almost exempt from such maladies, as are also the relatively high-lying sandy pine woods of the interior, except where they are situated near areas of swamp. These diseases are not usually of a very pernicious sort, except where they attack persons newly settled in the country, and who have not become acclimated. Besides the native fevers, this region is liable to invasion of the deadly yellow fever of the tropics. This malady has never become permanently fixed in Florida or any other portion of the United States. It is always imported from the West Indies or other more southern lands.

The population of Florida has been in part derived from the people who are settled on the coast plain which borders the Atlantic to the northward of the peninsula. In larger part, however, it is composed of folk who have come to the State from the northern portion of this country. The whites from the nonslaveholding part of the United States constitute a larger proportion of the population in this district than is found in any other equally extreme region of the South. The African element of the peninsula is relatively small, the proportion of those of this blood being in this district less than is found in any other lowland part of the old slave States. Besides the whites of English descent, Florida contains a notable body of people of Spanish origin. A small part of these Spaniards are the descendants of the colonists who occupied this country during the two centuries in which it was held by Spain. In larger part they have come from Cuba, having been drawn to the peninsula as artisans employed in the manufacture of cigars.

The peninsular district of Florida contains a considerable num-

ber of persons who are neither of English nor Spanish origin. In the country about St. Augustine there are numerous descendants of a colony which came from the island of Minorca, and in the southern portion of the peninsula there is a large and interesting remnant of the Seminole Indians. After the second Seminole war an effort was made to deport all these savages to Indian Territory. Many of them, however, escaped from their pursuers, taking refuge on the almost inaccessible islands in the interior of the Everglades. There they have remained, free from the influence of Indian agents. They have increased until the tribe probably numbers between three and five hundred souls. These Indians, made wary by their rude experiences with the whites,



The Florida Reefs.

with their dwelling-places well secured from invasions, have retained their primitive habits in a measure uncommon among our American aborigines. They have rarely been seen by travelers except when they come forth to exchange their peltries and the starch which they manufacture from the "cumpte root" with the traders along the shore. For many years they have been an inoffensive people, abiding in permanent dwelling-

places, and relying mainly upon agriculture for their subsistence.

Before closing this sketch of the population of the peninsula of Florida we may note the fact that on the islands of the Florida Keys there is a population which has been derived from England by way of the Bahamas, and which has certain interesting peculiarities. This body of folk, numbering in all perhaps two thousand souls, is the only part of our native people who commonly exhibit the peculiarity of what is known in England as the cockney dialect, which is characterized by the loss of the sound of the letter "h" where that consonant begins a word, and by its addition to many other words which properly begin with a vowel.

It seems likely that the peninsula of Florida, which is at the present time an essentially unoccupied country, is destined in the main to be settled by a people who will resort to it from the more northern parts of the country, and who will be led to the southern land in order to escape the rigors of the severe winters which prevail in the high latitudes of the continent.

Mexican Gulf District.

The region included in western Florida, Alabama, Mississippi, Louisiana, and Texas east of Austin, constitutes a field which is tolerably well distinguished from the other portions of North America. The whole of this district is bordered on the south by the Gulf of Mexico, and all the rivers of the field drain to that great inclosed sea. A large part of the area consists of lowlands, which were formed below the waters of the Gulf when they extended much farther to the north, and have in modern geologic ages been upborne above the level of the sea. This plain, like that which borders the Atlantic, is a part of the continental shelf formed next the shore-line by the detritus which is worn from the land and deposited on the sea-floor. From the low shore of the Gulf of Mexico this plain-land gradually rises in successive benches toward the interior of the continent. On the east it attains the southern foot of the Appalachian ranges, low elevations which divide the streams which flow into the Gulf from the tributaries of the Ohio. In the central portion of the area the lowland is continued indefinitely to the delta lands of the Mississippi and along its tributaries into the heart of the continent. On the west the lowlands gradually rise to the mountains of the Indian Territory and to the outliers of the Cordilleras in western Texas. The northern parts of Alabama and Mississippi drain

toward the Ohio, and the corresponding portions of the Texas district toward the Red River. Although the characteristic feature of these States, that which leads us to group them together in one district, is the plain-land of the Mexican Gulf, two of them —Alabama and Texas—have portions of their surface which, though they send their waters southwardly, attain to considerable elevations. In Texas the coast-plain passes, by successive upward steps, northwardly and northwestwardly into the great, gently inclined table-land which borders the Cordilleran system on the east.

The southward slope of this group of States presents features of climate which are on the whole tolerably well distinguished from those exhibited by any other portion of North America. These peculiarities are due to the relation of the land to the southern sea and to the northern interior of the continent. The waters of the Gulf of Mexico are, by the incursion of the Gulf Stream, maintained at nearly the same warmth as are the tracts of ocean which lie immediately beneath the equator. Therefore, the winds which blow upon the coast-land from the south have an almost tropical temperature at all seasons of the year. On the other hand, as this portion of the country lies wide open to the north, unprotected either by high mountains or by expanses of water, the winds which blow from the north are, at least during the winter season, exceedingly cold. It is doubtful if there is another portion of this country subjected to such extreme alternations of temperature as is this coast-belt during the winter season of the year.

The summer climate of this district is characterized by tropical warmth, which continues, with slight interruptions brought about by cooling winds from the high north, during the months between April and November. The heat, however, is less oppressive than in more northern districts, for the reason that the daylight is shorter and the earth has more time to cool during the night than in higher latitudes. This difference is well indicated by the fact that while sunstroke is of frequent occurrence in the northern part of the United States, it is a rare malady in the district about the Gulf of Mexico. The winter season is the variable portion of the year as regards temperature; gales from the north frequently bring freezing cold, and it occasionally happens that the thermometer falls on the shores of the Gulf to about 20° Fahr. These periods of frost are always of brief duration, enduring only while the north wind blows. The prevailing winter wind is from

A screw palm.

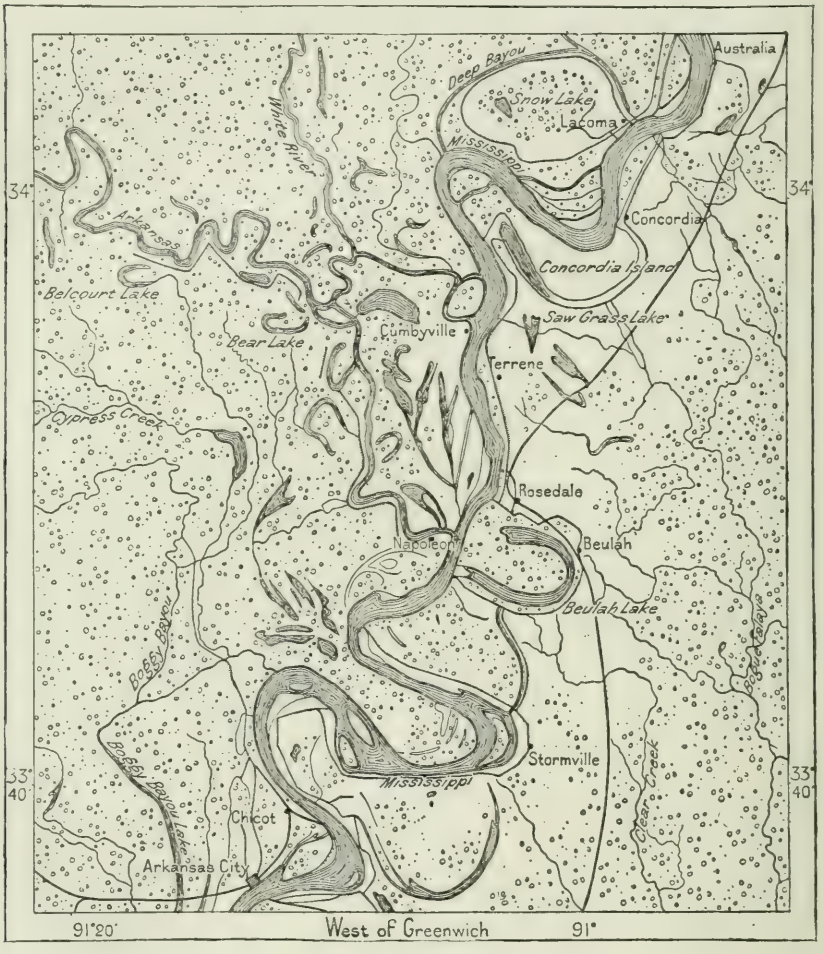
the Gulf of Mexico or the southern Atlantic, so that a freezing temperature is rarely maintained for more than twenty-four hours.

The rainfall over the whole of this district to the east of central Texas is relatively large. In southern Louisiana it amounts on the average to about ninety inches a year. From this point of maximum rainfall the precipitation gradually decreases in an eastwardly and northwardly direction, but over a part of the district east of Texas it averages about seventy inches per annum. West of Louisiana the decrease in rainfall goes on very rapidly, and attains such proportions that in the valleys of the Middle Red, Colorado, and Brazos Rivers the moisture is no longer sufficient to support the characteristic forests which cover the eastern portion of North America. From this land westerly the diminution in precipitation continues, until in western Texas the rain-giving influence of the Gulf of Mexico almost disappears, and the country becomes too arid for general agriculture.

The soil of the lowland district which borders the Gulf of Mexico is generally much more fertile than that which lies along the Atlantic coast. The reason for this considerable difference in the agricultural value of the land is found when we consider the diverse conditions under which these plains were formed. On the Atlantic coast the level country is mostly made up of *débris* which has been worn from the crystalline rocks that border the shore to the northward, or that occupy the country from which the rivers of the southern Appalachians drain. On the other hand, the *débris* forming the greater part of the lowland along the Gulf of Mexico has been in large measure derived from the interior portions of the continent, having been brought out to the shore by the streams which drain from that part of the land This silt from the interior of the continent is to a great extent composed of waste derived from rocks of a limy or clayey nature; a relatively small part of it only is of a siliceous character.

A considerable part of the lowland district we are now considering, an area of perhaps fifty thousand square miles, is underlaid by a soil the mineral elements of which have been brought into position by river currents. These soils are contained in the existing deltas of the great streams, and in the similar deposits which are no longer overflowed by the annual inundation and do not now have a distinct deltalike character. In the higher parts of this district, where the soils are derived from the older rocks by the process of decay, the fields are also more fertile than those of similar origin along the Atlantic coast, for the reason that the

strata are of a nature better calculated to yield an earth suited to the uses of plants. On these accounts the soil of this lowland district is on the average very much more fertile than that upon



——— Dyke.
The old site of Napoleon is now under water.
Scale 1 : 475,000. ——— 6 miles.

Mississippi-Arkansas confluence.

land of similar elevation along the Atlantic coast. The delta districts of the Mississippi and its tributaries, and the similar alluvial lands which occupy broad fields near the lower portion of the other streams flowing into the Gulf, have proved the most enduringly fertile area of this country, and this for the reason

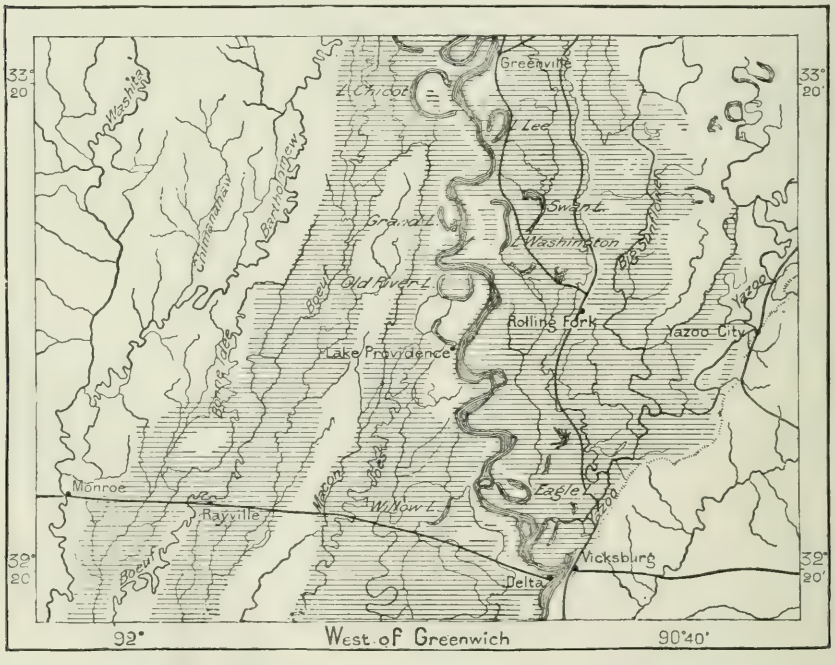
that the occasional overflows of the streams carry over the plain a tide of turbid water which deposits a coating of mud rich in the elements required by the crops. The field of good soils continues into the western part of Texas, even beyond the territory where there is sufficient rainfall to insure the growth of any of the domesticated plants.

The principal hindrance to the fit use of the soils of this district is found in the imperfect drainage of the alluvial land. The delta districts are all liable to overflow in the spring months, after the crops have been planted, and these inundations frequently ruin the chances of the planter during the season in which they occur. Along the Mississippi River this evil has been in part overcome by the institution of an extensive system of dikes—levees, as they are locally termed. Still, more than one half of the inundated lands in this field remains unclaimed, and the proper control of the river floods of the region will tax the engineering skill of the centuries to come. In the central and western portions of Texas the conditions of water supply are the reverse of those which have just been considered. In that part of the country the problem is not how to restrict floods, but how to retain and distribute the rain water in such manner as will serve to make the arid lands fit for the uses of man. It seems probable that a considerable portion of western Texas, where the rainfall comes mainly in the winter season, may be made fertile by a system of reservoirs and distributing canals, by which the flow of the streams may be stored and conveyed to the level lands, which need only water in order to afford good ground for tillage.

The forests of this district are generally of exceeding luxuriance. The field of the great Appalachian woods occupies all the territory along the shore of the Gulf of Mexico northward to the line of the Tennessee River and westward to near Austin. In no other portion of this great Eastern American forest do we find an equal number of species attaining to a like size and perfection of growth. In the higher-lying portion of the country of Alabama and Mississippi the hard-wood timbers maintain their hold. The several species of oak which are characteristic of the Blue Ridge and the Alleghany fields prosper in that section, and are considerably intermingled with the pines. On the lower-lying land the Southern pine abounds, and attains nobler proportions than in any other part of the country. In all the swamp districts, where the ground is perennially wet, the *Taxodium*, or bald cypress, flour-

ishes exceedingly. Within the limits of this district there is probably an aggregate area of not less than five thousand square miles which is occupied by this tree to the exclusion of other species, and probably a like area in which this cypress is plentifully commingled with other arboreal forms which demand a very wet soil for their nurture. These swamp-land areas of woods are among the most important timber reserves which this country now affords.

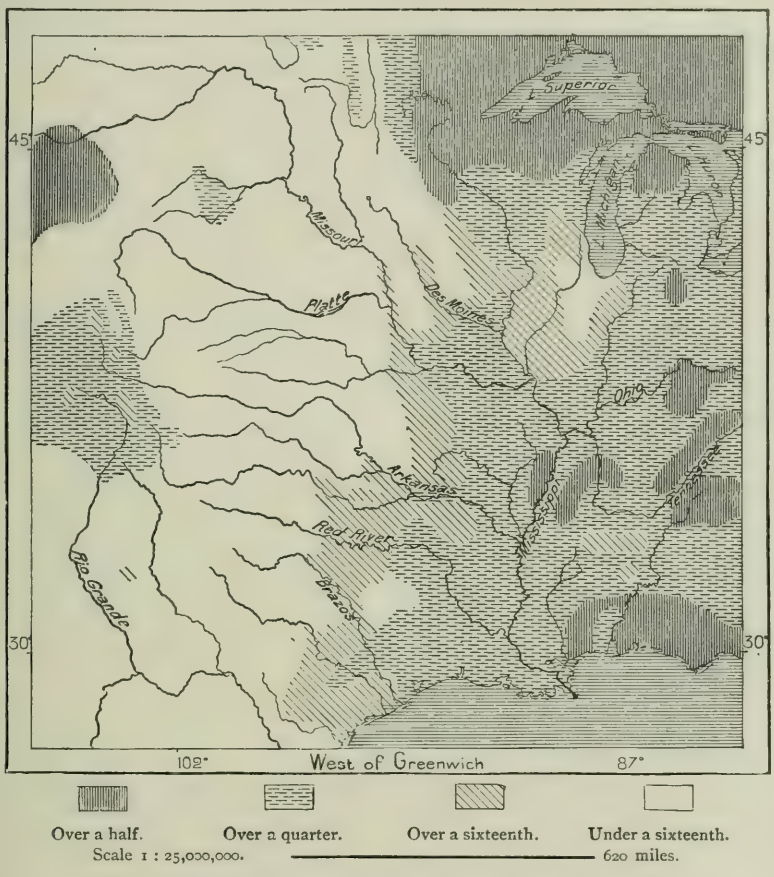
The agricultural products of the Gulf district are in variety greater than those of any other equally extensive portion of the continent. All the ordinary cereals do well in the northern portion of the field. Rice and the sugar cane are grown with tolerable success in the reclaimed swamp lands along the lower portions of the Mississippi and the other great streams. Experience seems to show that the whole of the district is better fitted for the growth of cotton than any other equally extensive area in the world. That crop is now, and bids fair long to remain, the



Flooded region between the Arkansas and Yazoo.

leading agricultural product of this part of the United States. In the northern portion of the district the root crops which are cul-

tivated in this country succeed tolerably well, and throughout the whole of its extent the familiar fruits used by our people attain a satisfactory development.



Range of forests in the central region.

Although the most fertile upland soils of this district have already been won to agriculture, it contains the largest and most valuable reserves of high-grade land which are to be found in this country. These lie in the undrained swamps which occupy extensive areas in all the States bordering on the Gulf of Mexico, and which in the aggregate contain an area of not far from thirty thousand square miles. These morasses vary in the measure of their inundation, from very wet woods where the land could be made fit for the plow by removing the timber and cutting occasional shallow ditches, to wide fields occupied by shallow lakes,

such as occur in the Mississippi Valley, and which can only be improved by costly engineering devices like those which have been applied to the drowned lands of Holland.

The mineral resources of the district about the Mexican Gulf are varied and important. About the head-waters of the streams which drain into the basin from southwestern Georgia and northern Alabama lie extensive fields of coal and iron. In 1880 the output of the Alabama coal mines amounted to 323,972 short tons; whereas, in 1889, it had grown to 3,378,484 short tons. The important coal deposits are limited in their extent, and lie mainly within the State of Alabama. The quality of the fuel is poorer than that in the more northern portion of the United States. It contains a larger amount of ash and sulphur than does the coal from the region about the head-waters of the Ohio and Tennessee, or the anthracites of Pennsylvania. Nevertheless, this area of mineral fuel is of very great value, for the reason that it lies near to the most extensive deposits of iron ore which are known on this continent to the east of Lake Superior, and also for the reason that the field is very accessible to the Caribbean district, and is, in fact, the only good area of coal which is conveniently placed for the use of this part of the world. Whenever a canal is opened through the Isthmus of Darien, or a marine railway constructed for the transportation of ships, the Alabama coal will doubtless find an extensive market along the Pacific shores of North and South America.

The iron ore of the north Alabama district and the neighboring fields of Georgia lies in part within the drainage of the Tennessee River. The greater portion of the deposit, however, is adjacent to the head-waters of the streams which flow into the Gulf of Mexico. The beds occur in the Palæozoic rocks which have been tilted at high angles by the mountain-building disturbances which formed the Appalachian system of uplifts. Although the ores of this district contain on the average not more than fifty per cent of metallic iron, and they are usually too phosphatic for the production of steel by the Bessemer process, they are excellently well suited for making foundry and mill iron, and can be converted into steel by what is known as the "basic" process. Owing to the fact that the beds are thick and are often exposed in positions extremely favorable for working, the cost of mining the ore is only a small part of that incurred in mining the magnetites of the Lake Superior district, which are at present the source whence more than half of the pig iron of the United States

is made. At certain of the Alabama iron mines enough ore to produce a ton of pig metal can be mined and loaded upon railway cars at an actual cost of about one dollar per ton, while an equivalent amount of ore from Lake Superior costs, when it is fed into the furnaces at Pittsburg, not less than eight dollars per ton.

Although the iron ores of this district, on account of the ease with which they are mined and the accessibility of the fuel required for their reduction, are certain to play an increasing part in the domestic commerce of the United States, it appears likely that the most important market for their product will be found beyond the sea. The continents of Africa and South America are now entering upon a stage of social development in which large quantities of iron will be demanded. Although both these great lands abound in feriferous ores, they lack the fuel which is required for smelting processes. The mines of Europe, already seriously taxed to supply the ever-increasing demand of that part of the world, can not afford the resources to meet these new economic needs. There is no other field so well placed for the needed supply as that of northern Alabama and the adjacent territory on the east and north. The next generation will doubtless see an export trade in iron from this district which is clearly destined to attain a very great importance.

Other and extensive deposits of iron ore occur in eastern Texas. These are, however, of inferior quality, and do not seem likely to add any value, except perhaps for the needs of the locality in which they occur. Yet farther west, in the arid-land district of that State iron ores have been discovered, but their extent and value are as yet undetermined. So far no coal of satisfactory quality has been found in any part of the district west of the Mississippi, although there are extensive beds of an unsatisfactory quality in central Texas. Therefore any future discoveries of iron ores are not likely to prove of commercial importance, unless they are accompanied by the disclosure of good coal fields—a contingency which the geology of the district shows to be most improbable. No deposits of petroleum or of natural gas, occurring in sufficient quantities to serve for economic purposes, have been found within the limits of this field, which lies immediately to the north of the Mexican Gulf.

The only other considerable mineral resource which is known in the region of the Gulf slope, in the States which we are now considering, is an extensive deposit of salt which lies in western Louisiana. In 1887, 341,093 barrels of salt came from this region.

This saliferous deposit occurs in the solid form known as rock salt, and, as is usual, the material is associated with gypsum. For some years this accumulation has been extensively mined, and there is at present no sign of its exhaustion. As it is the only deposit of this nature known in the district, it promises to play a large part in the industries of the country. The occurrence of salt in this position is in a geological sense very remarkable, for the reason that deposits of this nature can only be formed in parts of the world where the climate is so dry that the water of the sea or of rivers may be completely evaporated. At present this portion of the continent is the seat of a remarkably heavy rainfall. It is difficult to conceive how, during the Cretaceous or Tertiary time, when this material was accumulated, the climate could have been sufficiently dry to insure such an excessive evaporation. Salt deposits are also worked in central Texas.

At various points in the States of Alabama and Mississippi the beds of Cretaceous or Tertiary age contain a certain amount of lime phosphate in the form of nodules. As yet, none of the deposits which have been discovered are sufficiently rich in phosphatic matter to give them much importance. So far, however, there has been no systematic search for this material, and it seems not improbable that careful inquiry will disclose accumulations which may be of value. The geological structure of all this district is so far similar to that of eastern South Carolina and western Florida, in which phosphatic deposits abundantly occur, as to make it likely that they will be found at various points in the Gulf district. The central and southern portions of Texas, a section of the field which has not been as yet carefully examined by geologists, has a geologic structure such as to make it likely that phosphates occur in the strata. In the western portion of the last-named State, rather beyond the field of the lowlands which border the Gulf, deposits of copper and of manganese have been found, but their value has not as yet been determined.

The water supply of this district, as is usually the case in the lowland country, is not generally very well fitted to the needs of domestic use. In the northern portion of Alabama pure mountain streams abound; but when the rivers attain the plain-land they are necessarily much polluted by the sewage of the towns near their borders. Through the greater part of the district a domestic and civic supply can only be obtained in a satisfactory state of purity by means of bored wells. Owing to the geological

The sea grape.

structure of the country these subterranean waters generally contain more mineral matter than is desirable.

In all that relates to the healthfulness of the district this portion of the country has about the same conditions as those which affect the Atlantic coast land south of New York and the peninsula of Florida. Nearly all this area is liable to malarial fevers of the ordinary type. This liability is greatest when a particular area has just been subjugated to tillage. Experience shows that after a time the ground which is by plowing exposed to the sun loses, in part at least, its capacity of breeding malarial germs and becomes comparatively wholesome. In addition to ordinary malarial diseases, this district, like the other lowlands in the eastern parts of North America, is subject to an occasional invasion of the tropical yellow fever. Serious epidemics of this nature have ravaged the large cities of the coast line, and have occasionally extended to the northward, particularly along the banks of the Mississippi to the junction of the Ohio with that stream. Here, as elsewhere in the United States, this malady has never taken permanent root: each winter insures the destruction of its germs. The disease thus only recurs when its seeds are imported from points nearer the equator. It appears certain that a proper care in the sanitation of the cities will make it impossible for this plague to obtain any foothold in this part of the country.

The rapid alternations of temperature in the winter season, and the peculiar dampness of the climate, due mainly to the contact of the warm moisture-laden airs from the Gulf of Mexico with the cold current from the northern part of the continent, make this section of the lowland district of North America rather less wholesome than the territory of northern Florida or the coast region to the north of that State. Nevertheless, the physical condition of the people shows clearly that the district is tolerably well suited to the needs of those people of English descent who constitute the dominant part of the population. The colonies of Germans in central Texas, on the eastern margin of the moderately arid portion of the State, though planted about fifty years ago, have proved successful, the people retaining their vigor and living the farmer's life without suffering from climatal evils.

The population of this district of lowlands about the Mexican Gulf is, in its character, rather more varied than that of any other part of North America except the peninsula of Florida. The body of the white population was derived from the Virginian group of States, which, as we have already seen, was of nearly

pure British stock. This blood, however, is locally and considerably intermingled with that from France and Spain. The folk of French descent are mainly confined to the State of Louisiana, while they are somewhat intermingled with the whites of British ancestry and with the Spaniards. Although the Gallic population about the mouth of the Mississippi numbers perhaps not more than a hundred thousand souls, and is not the tenth part of the Canadian French, the colony has retained the language and other characteristics of the mother country in a remarkable measure. The French town of New Orleans is as sharply distinguished from the portion of the city which has grown since its occupation by our own people as is a part of Marseilles from a characteristic portion of New York. The tenacity with which these people have clung to their native customs is indeed surprising, and constitutes one of the most interesting and instructive incidents in our history. Taken along with the evidence afforded by the settlements of Germans in Pennsylvania, it shows that, where foreigners are domiciled in compact communities in this country, they may remain for generations comparatively uninfluenced by the spirit of our American life.

In the lowland district of Texas there are many Mexican Spaniards. These people, like their kindred in Old Mexico, are to a great extent intermingled with the aboriginal population of this part of America. They are a frugal, hardy, and tolerably industrious folk, and, although they lack certain qualities of our race, they afford a useful element in the population. As before noted, there are certain German settlements in Texas which were made about the middle of the century. Inasmuch, however, as the Teutonic people do not in any essential way differ from the English folk, these Germans have not contributed in any important measure to the variety of population in this district.

The most serious questions connected with the future of the lowlands which border the Gulf of Mexico arise from the large proportion of Africans in the population, and from the fact that, the whole of this great area, as far west as central Texas, appears to be peculiarly well adapted to the descendants of this tropical folk, and less well suited to the laboring population of our own race. It is true that the negro population in eastern South Carolina is, relatively to the whole number of people in the district, as large as that which is found in any other portion of the United States, but in South Carolina there is a very extensive upland territory which, from the conditions of its climate, is not likely

to be extensively occupied by the negroes. On the other hand, the greater portion of Alabama, the whole of Mississippi and Louisiana, and the eastern part of Texas, present conditions which peculiarly favor the rapid increase of the black people.

The whole of the district about the Gulf of Mexico, and the neighboring areas of Florida and the eastern section of the Carolinas, to a great extent derive the value they have to our race from the fact that they form the subtropical portion of a continent which is mainly a winter land. The early setting in of the summer season fits this district to supply garden products to the more northern regions, in which spring begins some months after the vernal time of the more southern land. With the increase in the facilities for travel, the resort of Northern peoples to this region, in which they may escape the trials of a Northern winter, becomes the greater. We may, in fact, foresee that in the centuries to come this portion of the United States will be a place of refuge for vast numbers of our population during the colder months of the year.

CHAPTER III.

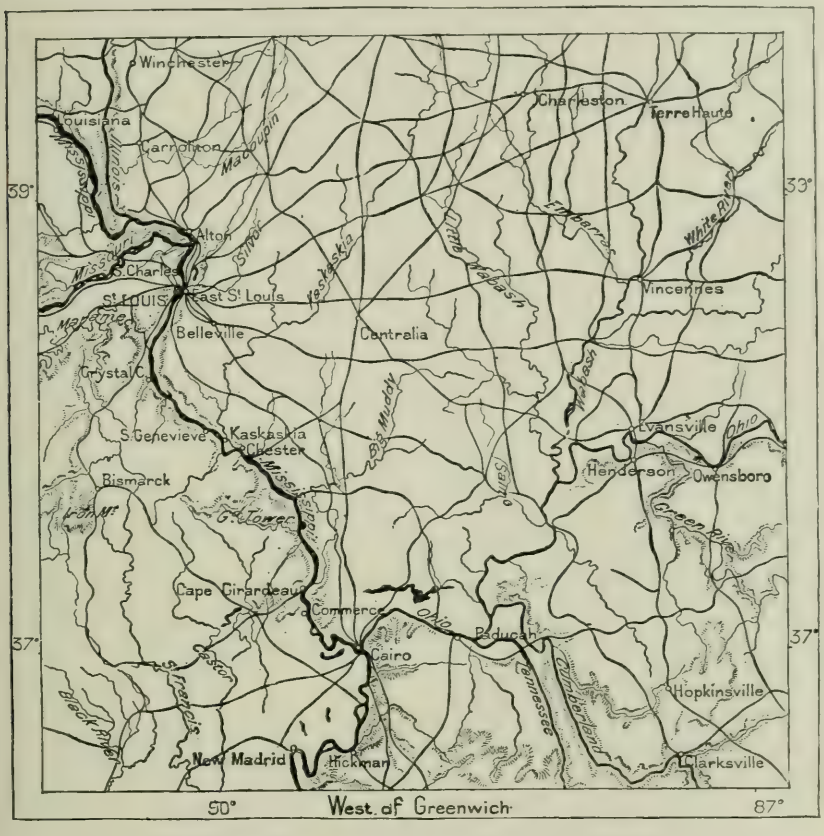
WHAT NATURE HAS DONE FOR THE WEST.

District of the Ohio Valley.

The region occupied by the river system of the Ohio contains an assemblage of States which vary greatly in most of their characteristics, yet they present certain common features which make it desirable to consider them in one description. The surface of nearly all this area lies at a considerable height above the sea. Excepting a small part of the field near where the Ohio joins with the Mississippi, the elevation of the country exceeds one thousand feet above the ocean level, and a large part of its surface attains an elevation of more than two thousand feet. On the northern border the basin of the Ohio is but slightly separated by the valley in which lie the Great Lakes of North America. On the east the head-waters of the stream descend from the loftiest portion of eastern North America. On the south the basin is parted from the Gulf district by the low spurs of the southern Appalachian system. On the west and southwest it lies wide open to the central part of the Mississippi Valley. The whole area of Kentucky and of Tennessee, except a narrow fringe of land in the western part of these States, drains directly into the Ohio River. The greater part of Illinois, Indiana, Ohio, and West Virginia, a portion of western New York, Virginia, North Carolina, Georgia, and Mississippi, contribute waters to its stream. No other river basin of equal area on this continent has the land it contains so well placed for the uses of our race, the soil so fertile, or the underlying earth so rich in mineral resources as this district of the Ohio.

The climate of this region is characterized by the existence of a tolerably long-continued summer or growing season, the duration of which in the northern and southern field varies considerably. In northern Ohio there is ordinarily some sign of springtime visible by the middle of March, but frosts continue until the first days in May. In northern Alabama the vernal season sets in

by the middle of February, and danger from frost is generally past by the first of April. North of the Ohio River the cold is tolerably enduring. Along the borders of the Tennessee River



Scale 1 : 3,600,000. 60 miles.

Meeting of the waters in the center of the Mississippi Valley.

the influence of the Gulf of Mexico is so far felt that there is rarely more than a week in the year during which the ground is frozen, and the winter season often passes without the surface being snow-covered for more than a few hours' duration.

Throughout this valley the winds from the Gulf of Mexico have a decided influence, and share nearly equally with the air from the northwest in determining the quality of the climate. The greater portion of the rainfall is derived from the air which comes from over the Mexican Gulf, while the northwest winds are dry. The precipitation varies from about sixty inches on the southern border and in the mountains on the east to about thirty-

five inches in the extreme northwest of this basin. Throughout the area the rainfall is sufficient, as regards its quantity and distribution generally, to secure ample returns from the fields. During the summer season the region, especially in its western and northern parts, is occasionally assailed by droughts of some severity. Yet more rarely the winter rains continue so far into the planting season that the crops are somewhat damaged by the excess of moisture. As a whole, however, this portion of the continent is perhaps more uniformly watered than any other equal area within its bounds. It is, indeed, doubtful if any other region of like extent beyond the limits of the tropics has a more regular rainfall or the precipitation better distributed for the needs of the agriculturist. The abundant supply of rain causes this district to be the seat of many large streams. The main Ohio is, measured by its flow, the largest tributary of the Mississippi, and among its affluents there are a number which are of sufficient size to afford navigation for large vessels.

In the element of navigable streams this district is perhaps richer than any other equally extensive field, except portions of the valley of the Amazon and a part of eastern China. Besides the main channel of the Ohio, the Cumberland, the Tennessee, the Kentucky, the Big Sandy, the Kanawha, and the Monongahela are all of much service for transportation purposes, and there are at least a dozen other streams which are serviceable to the interest of navigation for a considerable part of the year. Hundreds of the lesser tributaries are useful for downward navigation, and serve to convey the products of the fields, forests, and mines to market. In the aggregate there are probably not less than twelve thousand miles in length of streams in this district which have some importance as transportation routes. The main Ohio, although much of its commerce has been diverted to the railways which run parallel with its course, remains one of the most important commercial arteries of the continent. Although the streams which are tributary to this river, as is indicated by their navigable character generally, have but a slight fall, they are often fitted to afford excellent water powers. So far this source of power has not been much used, for the reason that the steam-producing coals of this district are extremely low-priced, and occur in very large quantities in various parts of the field.

The soils of the Ohio district are of an extremely varied quality. In the mountainous districts of southwest Virginia, West Virginia, western North Carolina, eastern Tennessee, and eastern

The mammoth terraces, Yellowstone National Park.

Kentucky only the broad valleys between the greater ridges are fitted for the use of the plow. Perhaps three fourths of this part of the Ohio basin are suited for agriculture in any form; the remainder, however, with exceptions, which probably in all do not amount to as much as fifteen hundred square miles, bears luxuriant forests, and even the portions which are too infertile to maintain dense woods are tree-covered, and not without value as nurseries of timber. On a small portion of the area of the basin, perhaps in all not exceeding six thousand square miles, is inundated land—either permanent swamp, or so subject to periodic overflows by the streams that it can not be tilled without costly engineering devices. No other equal area of the continent has so little of its surface unfit for the uses of man.

In the region north of the Ohio, except a portion of the country in southern Indiana and Illinois near the margin of the Ohio, the surface is underlaid by a deep coating of glacial drift, which in this portion of the continent attains a greater thickness than in any other part of the field affected by the glacial ice. As is usual with soils of this description, the drift-underlaid region of western New York, Pennsylvania, Ohio, Indiana, and Illinois affords soils of an even quality and of remarkable endurance. The fertility of this district is greater than that of the drift-covered sections in the other parts of the country, for the reason that the rocks which were broken up by the glacier and distributed over the surface of the land were mostly of a chemical nature well suited to afford food for plants. Moreover, in this field there are relatively few areas occupied by sand plains, which, as we have seen in our account of the New England district, afford but infertile soils.

In the driftless section of the Ohio Valley the character of the soil depends upon the nature of the rocks which immediately underlie it, or, where it is formed on alluvial deposits, on the character of the strata which are exposed in the upper portion of the valley where the given field lies. Owing to this more immediate derivation of the soils on the southern division of the Ohio drainage, the country exhibits very remarkable contrasts in the measure of its fertility—contrasts which are due to the diverse conditions under which the rocks of the deeper earth were formed. Thus, in eastern Kentucky and central Tennessee, where the earth is underlaid by the coal measures, the greater part of which deposits are of a sandy nature, the soils are usually thin, and can only be reckoned as of the third order of fertility—

that is, they may serve to maintain a population which depends almost altogether on the products of its own fields, and is unable to afford any considerable share of luxuries, such as may be acquired by an export trade. This relatively infertile field continues to the westward to a line along which the deeper-lying Silurian limestones appear at the surface. Here suddenly, often within a distance of a few hundred feet, the nature of the soil undergoes a wonderful change. It at once takes on an exceedingly fertile character. The area of these fields underlaid by the Silurian limestone is commonly known as "the Blue-grass Region" of Kentucky and Tennessee, for the reason that the species of grasses belonging to the genus *Poa*, which are common in other parts of the world, here take on a singular luxuriance of growth, and in their time of blossoming give to the fields they occupy a distinctly blue tint. This group of rocks underlies the southwestern portion of Ohio; but in that district, owing to the considerable thickness of the drift mantle, the soil is not quite as fertile as in the section south of the Ohio. The blue limestone soils are continued southward through Tennessee to the northern border of Alabama, but owing partly to the sandier nature of the rock in that section they produce somewhat less fertile soils than in the central portion of Kentucky.

The exceeding fertility and the remarkable endurance to tillage of the soils in this limestone district entitle the field to rank as the best portion of our American agricultural lands. When first subjected to agriculture, the soil is somewhat less productive of grain than the best of those in the prairie district of the Northwest. They afford, however, from the beginning, better grass land and are suited to a rather wider range of crops. Their principal advantage, however, consists in the fact that with moderate care they can be maintained in a higher state of productiveness than any of the prairie soils. The explanation of this greater permanence of quality is easily perceived. The fertility of the prairies is only in a subordinate degree due to the character of the underlying rock. The subsoils are usually of a relatively infertile nature, and the refreshment of the tillable layer which is brought about by subsoiling is usually not great. The soils of the limestone district of Kentucky, on the other hand, owe their fruitfulness to the fact that they are underlaid by rocks which abound in fossils belonging to groups of animals which had the organic habit of building lime phosphate into their bodies. These rocks are readily decomposed by the action of the rain water,

and, as they decay, provide materials for the continuous restoration to the soil of the mineral matters demanded by vegetation. When by tillage the earth is somewhat impoverished, deeper plowing so contrived as year by year to mingle a portion of the subsoil with the layer in which the plant roots feed, will commonly in large part restore the waste brought about by cropping.

In southwestern Kentucky and the neighboring portions of Tennessee there is an extensive field underlaid by limestones which were formed just before the time of the coal measures, and which afford soils only a little less fertile than those of the blue-grass district. In the valleys of the streams which form the head-waters of the Tennessee there are also considerable limestone districts, partly of Silurian and partly of subcarboniferous age. Thus, within the basin of the Ohio we have an area of about twenty thousand square miles where the fields, owing to the fertilizing nature of the bed rock, are to a great extent insured from exhaustion, and where the soil-tiller is in a measure exempt from the tax which the need of manuring the soil commonly places upon him. Including the alluvial lands bordering on the Mississippi, the Ohio and its greater tributaries, and also the admirable soils of the drift region north of the Ohio, we may safely reckon the very rich fields of this district as occupying an area of not less than one hundred and ten thousand square miles. The remainder of the basin affords soils of a lower order, but the larger part of it is not fitted to produce any considerable amount of grain. It is, however, suited for other agricultural uses, much of it being excellently well adapted to the growth of certain varieties of tobacco or for fruit culture.

The valuable timber of this country is mainly found in those broad-leaved species of trees that lose their foliage during the winter season. There are thirty or more kinds which have an economic importance. First among these in value we may note the tulip tree, which in this part of the country attains its best development. No other species of plant belonging in eastern North America attains to the dignity and beauty commonly exhibited by the adult forms of the tulip tree. The trunks often rise to the height of a hundred feet or more without a limb, and are of a beautiful, even columnar form. The white oak, the best of our American construction timbers for varied use, abounds throughout this district and attains its best growth on lands of the second quality. The other species of oaks, known as the red, Spanish, post, and

chestnut oaks, also abound, but their timber is less valuable, and as yet has not entered to any extent into use. The beeches abound in the clayey districts; the black walnut and the cherry were both originally very abundant on the fertile limestone land and in the coves at the head-waters of the mountain streams, where, owing to the small power of the stream, a thick layer of fertile soil had accumulated. In the western portion of the district, in the States of Kentucky and Tennessee, the holly takes on a treelike growth, and, though less well developed than in the district beyond the Mississippi, affords a certain amount of timber well suited for the uses where a hard and easily carved wood is desired.

For the first half century in the growth of this country these forests were, owing to the imperfect transportation, of little economic importance. Only of late years have they furnished much material for export trade. They are now, however, fast becoming valuable properties, and owing to the rapidity with which the trees developed and of the excellent quality of the timber which they afford, it seems certain that in the centuries to come the remaining woodlands will have a great value as sources of timber supply for foreign export, as well as for the needs of the vast unwooded country beyond the Mississippi. At least one fourth of the Ohio Valley is better fitted for timber culture than for agricultural use. The average returns which could be obtained from it by a proper system of forestry are probably greater than those which the plow would afford.

The mineral resources of this district, though limited in variety, are of exceeding economic importance, and promise to become the most determining of the natural features in all that relates to the social condition of the valley. We may advantageously begin our account of these materials of the under earth by a statement concerning the substances elsewhere important, which are not found in valuable quantities in this district. The precious metals do not occur in this field. Ores of copper were formerly worked in the Ducktown district of the upper Tennessee, but the mines are now abandoned. Galena, or sulphide of lead, occurs in many parts of the limestone district, but owing to the vast deposits of a more workable nature in the region west of the Mississippi there is no probability that any of the veins within the Ohio Valley can be mined with profit. Ores of manganese are sparingly exhibited in the region of the upper Tennessee, but these are so scanty that they are not likely to have a commercial value.

The really valuable mineral products of this district are limited to the iron ores and the fossil fuels. In these two elements of subterranean wealth this field is exceedingly rich. As regards its sources of fuel supply there is probably no other area of equal extent which is so amply provided. The fossil fuels may be divided into three groups: coal, petroleum, and rock gas. To these also we may, for convenience, add certain deposits of an asphaltic nature, which as yet are only known to occur in western Kentucky, and which are likely to be extensively used for road materials.

The coal deposits of this district consist altogether of the bituminous varieties of that substance—that is, they all give in burning a long flame, which is due to the relatively large amount of volatilizable carbonaceous material. Certain of the thicker layers extending from the region about Pittsburg southwardly to the field near Cumberland Gap contain but a small amount of ashy matter, often as little as two or three per cent, and are also low in sulphur, which is an extremely harmful material in fuel which is to be used for smelting ores. Owing to the thickness and horizontal position of these beds the coal can be mined at a less cost than in any other part of the United States. Although it is good for ordinary domestic purposes and for making gas, its greatest value is found in the hard and strong coke which may be manufactured from it. This peculiar form of fuel has of late years become of the utmost importance in the work of iron-smelting, and so these caking or coking coals are to play a most important part in the great history of iron manufacturing.

The greater portion of the coal of this district is in thinner beds, and contains more ash and sulphur than the few strata which are fit for the manufacture of coke. Nearly all the beds, however, which are of workable thickness are suitable for domestic purposes and for the production of steam. A rarer variety of bituminous coal occurs in certain limited fields, none of which are known to extend over an area of more than a few hundred acres. This substance is known as cannel coal, and it is made up of deposits which were accumulated in the small lakes which lay in the old swamps amid the peat-bogs which formed the ordinary coals. On account of its bright luster and the long flame which it forms in burning, this cannel coal is much prized for domestic fireplaces, and the large amount of volatile carbonaceous matter which it contains makes it useful in the manufacture of gas.

The distribution of the coal deposits of the Ohio Valley is as

follows, viz.: The coal-bearing strata are divided into two great detached fields and a number of smaller areas, which are closely related to one or the other of these principal sections. The eastern coal field occupies the head-water district of the Ohio drainage in the States of Pennsylvania, West Virginia, Virginia, Kentucky, and Tennessee. According to the census bulletins, the output of coal from these States, in 1889, was as follows: Pennsylvania, 40,665,152 long tons of anthracite, and 36,174,089 short tons of bituminous coal; West Virginia, 6,231,880 short tons; Kentucky, 2,399,755 short tons; and Tennessee, 1,925,689 short tons. In nearly all these fields the output has more than doubled in the decade between the tenth and eleventh censuses. It is a part of the great Appalachian coal district which extends from central Alabama to near the southern border of New York, and from central Kentucky to beyond the ridges of the Alleghanies into the drainage basins of rivers which flow into the Atlantic. By far the greater portion of this Appalachian coal field is drained by rivers which fall into the Ohio. This basin has in all about forty-five thousand square miles of this area of coal-bearing rocks. Only the fringes of the field extend beyond the Ohio Valley and on to the slopes which lead to the Atlantic and the Gulf of Mexico. In western Kentucky and southern Illinois * there is another carboniferous district, occupying an area of not far from twelve thousand square miles. The coals of this area are, as regards both their quality and position, much less valuable than those of the Appalachian field. They are prevailingly much more ashy, and contain a larger amount of sulphur and less volatile combustible matter. It is as yet doubtful whether a coke suitable for the needs of a blast-furnace can be made from them. Owing to the generally level character of the country these coals in almost all cases have to be mined through vertical shafts, which makes it decidedly more costly to win the fuel than where, as is often the case in the Appalachian district, the mines may be opened by means of galleries entering from the hillside.

The next element in commercial importance which within the limits of this valley is drawn from the under earth is petroleum, which was originally introduced into the commerce of the world by the sources which are afforded in the extended fields of supply along the margin of the upper Ohio and its tributary the

* Illinois, in 1889, ranked second as a coal-producing State, the output amounting to 12,104,272 short tons.

Alleghany River. So far the petroleum of this district has been produced in the main from a field which occupies a part of northwestern Pennsylvania and the contiguous portion of Ohio;* from a small area in West Virginia,† which also lies near the main channel of that stream; and from a third and relatively unimportant field in southern Kentucky just south of the Cumberland River. Although petroleum in small quantities has been discovered in various other parts of this basin of the Ohio, the thoroughgoing exploration to which this district has been subjected in the search for rock oil makes it tolerably clear that the great store of the substance lies in the field about the upper Ohio. Some of these outlying deposits, however, because they afford oil of peculiar quality, may have certain economic importance. Where their products are suitable for lubricating purposes, though the wells yield but small quantities of material, they may be profitably worked.

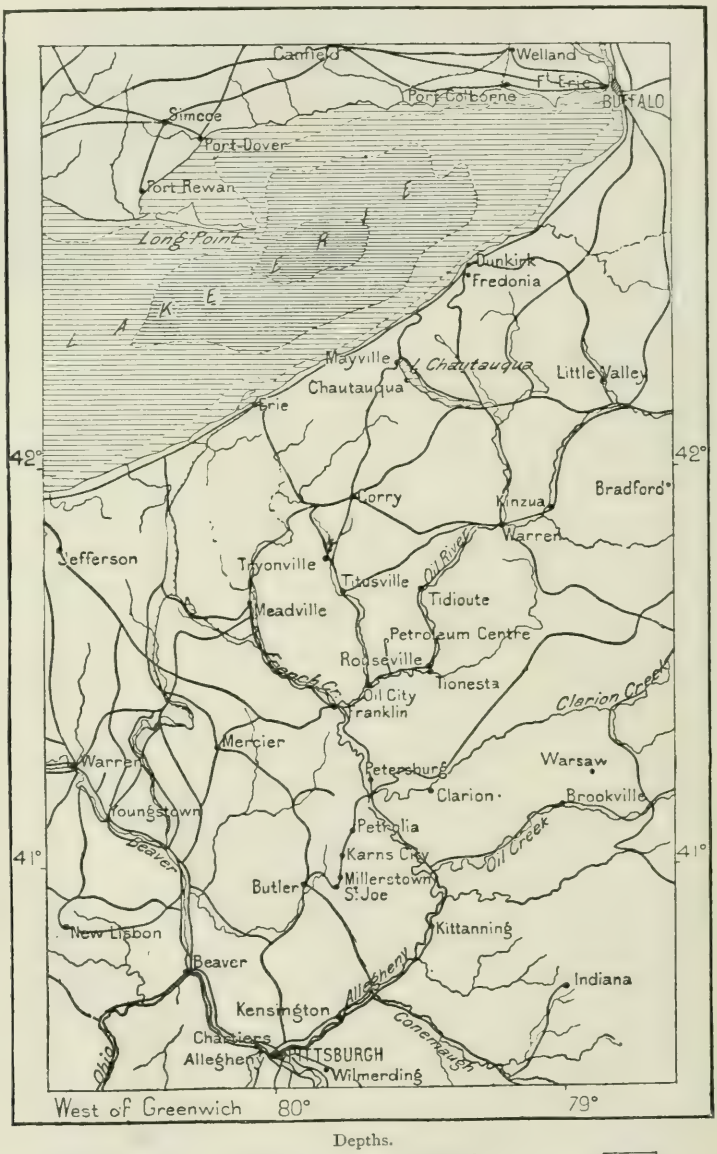
As petroleum and the various substances extracted from the crude state of the fluid are now indispensable economic elements in our civilization, it is a satisfaction to know that the rocks from which they may be obtained exist in such quantities, and are so readily obtained, that the product can be secured at a cost not very much greater than is required to obtain the crude oil and to refine it for use. The area occupied by the Devonian black shales is not far from one hundred thousand square miles, and its average thickness is probably not less than a hundred feet. If this material should throughout prove to contain as much as fifteen per cent of the petroleum group of substances, it would afford practically an inexhaustible source of supply. The greater portion of the Devonian black shales lies within the valley of the Ohio. It is, indeed, the most characteristic deposit in this district. Although there are other beds of a similar nature in other parts of the world, this deposit of the Ohio Valley is by far the largest which is known to geologists. It may therefore be fairly regarded as one of the valuable though not immediately available resources of this part of the country.

The natural gas of this field has long been known as of a burnable nature. For more than half a century it has been used at the salt-wells of the Kanawha, where it comes forth with the brine. It has served well as a fuel used in the evaporation of the

* Out of a total output in the United States, in 1889, of 34,820,306 barrels of petroleum, Pennsylvania produced 21,486,403, and Ohio 12,471,965 barrels.

† The output from this field, in 1889, was 358,269 barrels.

fluid in the pan. It was not, however, until the latter part of this century that it crept into more general use and became of com-



Oil and natural gas region.

Sheep-shearing.

mercial importance. Only within ten years has it come to play a large part in the manufacturing industries of the Ohio Valley, where the principal supplies are found.* The extent of country underlaid by rocks containing natural gas is much greater than that in which petroleum is found. Nearly all the strata below the level of the coal measures and above the Potsdam sandstone in the Ohio Valley contain more or less of this material, which is yielded to borings such as are made for petroleum. The quantity of the gas, however, varies greatly in different parts of the district. The most plentiful sources of supply lie in the region where petroleum is found. This is naturally the case, for the gas is probably only one of the series of products formed in the decompositions which make the rock oil.

The natural bitumens which constitute the fourth group of burnable carbonaceous substances occurring in the Ohio Valley are, so far as is at present known, limited to a small field in western Kentucky, between the Ohio River and the Green River. In this section the sandstone rocks lying in the lower part of the coal measures are extensively impregnated with a bituminous material resembling asphalt, which promises to be valuable for use as a road-making material such as is frequently applied in the streets of towns. As the discovery of this substance in Kentucky is of very recent date, it is not yet possible to say much concerning its economic value. According to Mineral Resources for 1889–'90, the bituminous rock of Kentucky does not differ essentially from that produced in California.

The most widely distributed of the mineral resources of this district and that which in economic value ranks next to coal is the iron ore. There are three principal levels, or, as they are called by geologists, horizons, in which the ores of this nature characteristically occur. The lowest of these is in the section known as the Clinton, one of the divisions of the Upper Silurian; the second is in the horizon of the Oriskany; the third occurs on the top of the subcarboniferous limestone, in most cases immediately below the pebbly deposit known as the Millstone Grit. The lowermost of these limestone ores is extensively developed throughout the eastern portion of North America, from the shores of Lake Ontario southward into central Alabama. The greater portion of the iron

* The amount of coal displaced by natural gas in 1887, chiefly in Pennsylvania, was 9,867,000 short tons, at a value of $15,838,000. Much more than this amount of gas was obtained, but there is no basis for a calculation of this, since a great deal of it was entirely lost.

ores of Pennsylvania, a large part of those from New York, the deposits which have made the wealth of Birmingham, Ala., the ores at present most extensively mined in Kentucky, Tennessee, and southwestern Virginia, are derived from these ferrated Clinton deposits. Good steel can be made from these ores by the process known as the "basic," and though the cost of this method of treatment is about two dollars more per ton than is required by the Bessemer or acid system of purification, the greater cheapness of the ore makes it advantageous to produce steel from these deposits.

A short vertical distance above the level of the Clinton ores, in the horizon of the Oriskany sandstone, there are occasional deposits of iron ore of excellent quality for furnace use. So far only a few areas of these Oriskany ores have been found, and those of a workable character lie altogether in the western part of Virginia and in eastern Kentucky. The somewhat scattered nature of the deposits is probably due to the fact that the limestone in which the iron has been concentrated was originally distributed in very local accumulations, and not, as is usual in such deposits, in the form of a widely extended layer.

The third and uppermost horizon of ores of good quality lies on the top of the subcarboniferous limestone. Wherever this horizon is exposed an iron-ore layer of greater or less thickness is almost sure to be found. As the beds of this age have their edges appearing at the surface in many parts of the Ohio Valley, forming altogether an outcrop lined in the aggregate some thousands of miles in length, the subcarboniferous ores are accessible throughout a great extent of country. Unfortunately, however, the beds are usually rather thin, and where of workable thickness they are generally accumulated in somewhat detached masses termed pockets. Owing to the originally pure nature of the limestone which has been altered to iron ore, this layer yields an excellent iron.

In the lower portion of the coal measures there are a number of beds of iron, which at one time, in the region of the upper Ohio, were extensively mined. These deposits commonly do not exceed about a foot in thickness, and though they are rather free from deleterious admixtures such as phosphorus and manganese, they carry but a small amount of metal; usually not more than thirty-five per cent of iron can be obtained from them. With the recent fall in the price of iron these ores of the coal measures have become practically worthless, and they will not again be of

economic value until the rich deposits of ore which occur in other parts of the district have been exhausted.

While the iron ores of the Ohio Valley are much less rich than those which occur in the region about Lake Superior, their position is peculiarly advantageous for the manufacture of pig metal and of steel. Owing to the extensive outcrops of the beds they can to a great extent be mined by open-air digging, the miner being spared the cost and dangers arising from underground work. Moreover, almost all these ores lie contiguous to coals which in their raw state or in the form of coke are well suited to use in furnaces. The natural seats of manufacture are in the densely peopled part of the country, where there is an extended market for their products, and they generally lie near to the greater streams, and are thus easily and cheaply conveyed by boats throughout the wide field which is made accessible by the rivers of the Mississippi Valley.

Our account of the mineral resources of the Ohio Valley should include two substances, once of considerable economic importance, which are no longer of any value among the earth products of this region. These are salt and saltpeter. For fifty years or more after the settlement of the valley the people were dependent for salt on the saline springs which break forth in various parts of its area. At Big Bone Lick and various other of these sources the hunters found that the wild animals, such as the deer and buffalo, came at certain times of the year for the salt which they required. Therefore, in their hunting they were naturally led to these sources of supply, and they made the salt required for their own use and for the supply of their domesticated animals by boiling the waters from these springs. After a time they learned to bore wells into the rock in various parts of the country, and from these they generally obtained richer brines. A half century ago there were in the Ohio Valley a dozen or more considerable establishments for the manufacture of salt from these underground waters, which are, in fact, the waters of the ancient seas which were imprisoned in the strata at the time when they were laid down on the sea floor. Of late years the discovery of richer brines, and of rock salts in the basin of the Great Lakes, have rendered these more costly sources of supply in the Ohio Valley comparatively valueless.

During the first half century after the settlement of the region west of the Alleghanies there was much difficulty encountered in obtaining a sufficient supply of gunpowder for the firearms

upon which the people depended in hunting and in warfare. At the outbreak of the War of 1812 this need became crying, and it led to a careful search for all the sources whence saltpeter could be obtained. It was soon found that the caverns of western Kentucky, the Mammoth Cave, and the other grottoes which abound in that part of the country contain near their entrances great quantities of nitrous earth; therefore for a time there was a considerable manufacture of this material, the work being carried on in the recesses of the caverns. Those who have visited the Mammoth Cave have seen the remains of these subterranean factories, where for years oxen and horses were stabled in the depths of the earth, and used to draw the fine, loamy matter to the leaching-vats. In case of need the cavern districts of the Ohio Valley could afford extensive supplies of saltpeter.

The water supply of the cities in the Ohio Valley presents a somewhat difficult problem. In the eastern portion of the district, where the mountain streams drain from valleys which are not likely ever to be occupied by considerable bodies of people, it is now, and probably ever will be, easy to secure pure water for the use of towns; but in the central and western portions of the district, where the rivers have coursed for long distances through valleys which are the seat of a population already dense, and rapidly increasing in numbers, the streams are already seriously contaminated, and are sure each year to become less fit to be used as sources of drinking-water. In many another part of the world where these conditions exist it is possible to obtain an ample supply of wholesome water by wells sunk into the porous underlying strata. Unfortunately, however, this resource is generally unavailable in the Ohio district, for the reason that the strata still contain a greater or less proportion of the brines which were inclosed when the beds were laid down in the old ocean. Where this is not the case, the subterranean waters are generally limy, slightly sulphurous, and occasionally mixed with small quantities of petroleum.

Experience of more than a century has shown that nearly the whole of the Ohio Valley is, as regards its healthfulness, admirably suited to the use of man and of his domesticated animals. Only a small part of the area—that which is occupied by the alluvial land along the Mississippi, and in the narrow valleys of the streams which are tributary to the Ohio—is to any extent affected by the ordinary malarial diseases. Experience has shown that it is only where the level of the ground water is subject to great

seasonal variations, particularly during the summer and autumn months, that the germs of malarial disease are readily bred. Yellow fever, though it has occasionally invaded the part of this district which lies to the south of the Ohio River, and on two of its invasions has proved very deadly along the borders of the Mississippi to the southwest, has never shown any tendency to become a serious malady within the limits of the Ohio Valley. The colonies of the disease which have from time to time been established at several different points in Tennessee and along the channel of the main Ohio have been easily stamped out. It is evident that the conditions of soil and climate of this part of the country are not favorable for the establishment and propagation of the species of disease-germ which give rise to this malady.

As regards their origin, the people of the Ohio Valley exhibit great local differences. South of the Ohio, the greater part of the folk trace their descent from the colonists who settled in Maryland, Virginia, and North Carolina. Probably nine tenths of the people of European descent in this southern section of the valley are of essentially English blood, and have come to the region from the original group of colonial settlements. A considerable portion of the remainder of the white people are from the other Northern States and are also of English origin. A notable fraction has been derived from the Pennsylvania Germans; a small portion, perhaps in all not more than two per cent, are Celtic Irish. This southern section of the Ohio Valley, at least as regards its white population, probably contains a larger body of folk whose blood is derived from pure English stock than any other part of this country. It is doubtful, indeed, if in the mother country itself there now exists any body of population as little commingled with foreign blood. North of the Ohio River the population exhibits the complicated intermingling of peoples which is characteristic of almost all portions of the great West. Nevertheless, the mass of the population is of English derivation, and the greater part of its other elements is from Germany, having come to the country either by recent immigration or in the secondary way, from the German settlements in Pennsylvania.

Although the white population of the Ohio Valley is, on the whole, tolerably homogeneous, there are certain districts which are mainly occupied by somewhat discriminated and peculiar groups of people. Thus, a portion of the Scioto Valley is to a great extent tenanted by the descendants of Virginians, and at various other points in the region north of the Ohio the folk still

bear the stamp given to the communities by the original colonists from New York, New England, or the other characteristic colonies on the more southern portion of the Atlantic coast. A part of central Kentucky, in and about the county of Washington, is occupied by the descendants of a Maryland Catholic colony which was founded in the early days of the State, and which has preserved the religious and social characteristics of the English Catholic folk. In the valley of the Tennessee and the Cumberland Rivers the observer may note a people derived from the socially unfortunate colonies which were planted by the land company of North Carolina in the eastern district of that State. The progeny of these people, commingled with the descendants of the lower-grade peasants who in the colonial time found a place in the Virginia group of settlements, constitute the lowest class of the Southern whites—an unintellectual folk, with little physical vigor, and who are about as unfit material out of which to make an American citizen as exists on the continent.

The negro population of this district is, considering the fact that more than half its area lay within the old slaveholding States, of relatively small amount. This is due to the fact that quite one third of the area in the region where slavery found a place, being of a mountainous character, was unfit for agricultural use in large plantations. The folk who settled in these hills could not profitably employ slave labor, and therefore the institution did not develop in their society. Thus, in the hill and mountain district of eastern Kentucky, and in the neighboring elevated portions of Tennessee, Virginia, and North Carolina, negroes have always formed a less considerable element in the population than in New England.

In the lower lying and richer portions of Kentucky and Tennessee there is a considerable element of Africans, but the proportion of this blood to that of the whites in the southern section of the Ohio Valley does not exceed about one to ten. Several conditions have co-operated to bring the negroes of this district to a relatively high state of culture. In the first place, essentially all the folk of African blood in this part of the country came from the slaves which were brought in the earlier part of the last century to the Virginia group of colonies. Therefore the ancestors of these people, having been long upon the soil, the race has had a greater opportunity of securing the training in the ways of civilization which contact with the whites has so singularly afforded to the African savages. As the negroes civilize with a rapidity

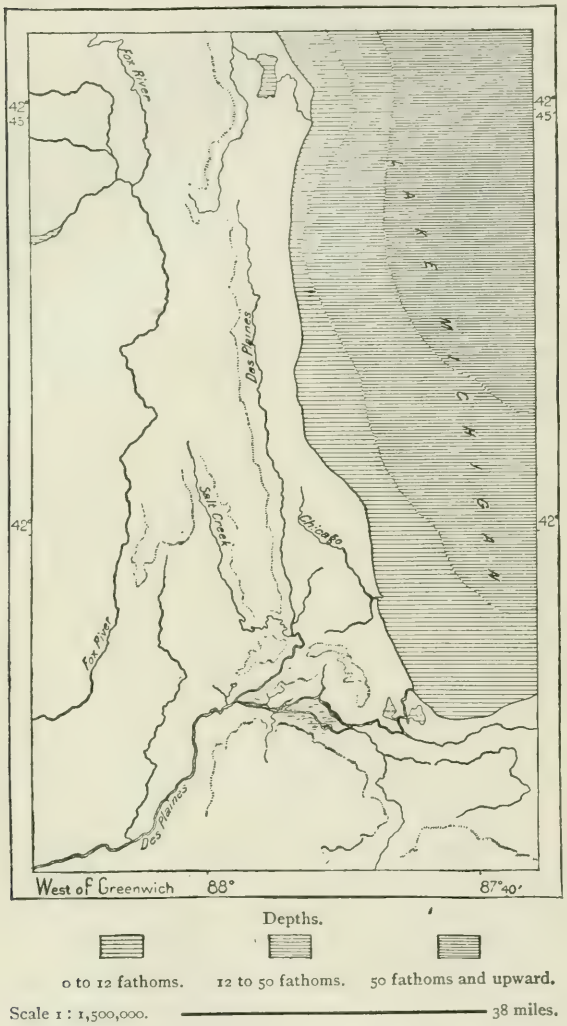
unknown in the case of any other savages with which our race has had to deal, the difference of one or two generations in the length of their sojourn on the continent makes a great change in their social and moral state. It is also a noteworthy fact that the greater portion of the blacks who were held as slaves in the Ohio Valley were retained as household servants, or where used as farm hands were kept about the farmstead, in immediate contact with the families of the proprietors, and not isolated from the improving influences of the home, as was the case on the more southern plantation. In passing southward from the Ohio Valley, where the negroes have generally been in close social relations with the whites, to the plantation country of Mississippi and Alabama, where the relations between the races were much less intimate, the trained observer can at once note the difference in the condition of the blacks, the more southern negroes not having attained as high a station.

The District of the Great Lakes.

Although we have had occasion to touch upon a part of the ground occupied by the region of the Great Lakes in the account of the New York group of States, the region is so peculiar in many ways that it deserves a special consideration. On the north, this district contains the larger portion of the tillable land of the Canadian province of Ontario. On the south of the Great Lakes only one American State (Michigan) is contained altogether within the valley which they occupy, but portions of seven other commonwealths—namely, Minnesota, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania, and New York—lie about these great fresh-water seas.

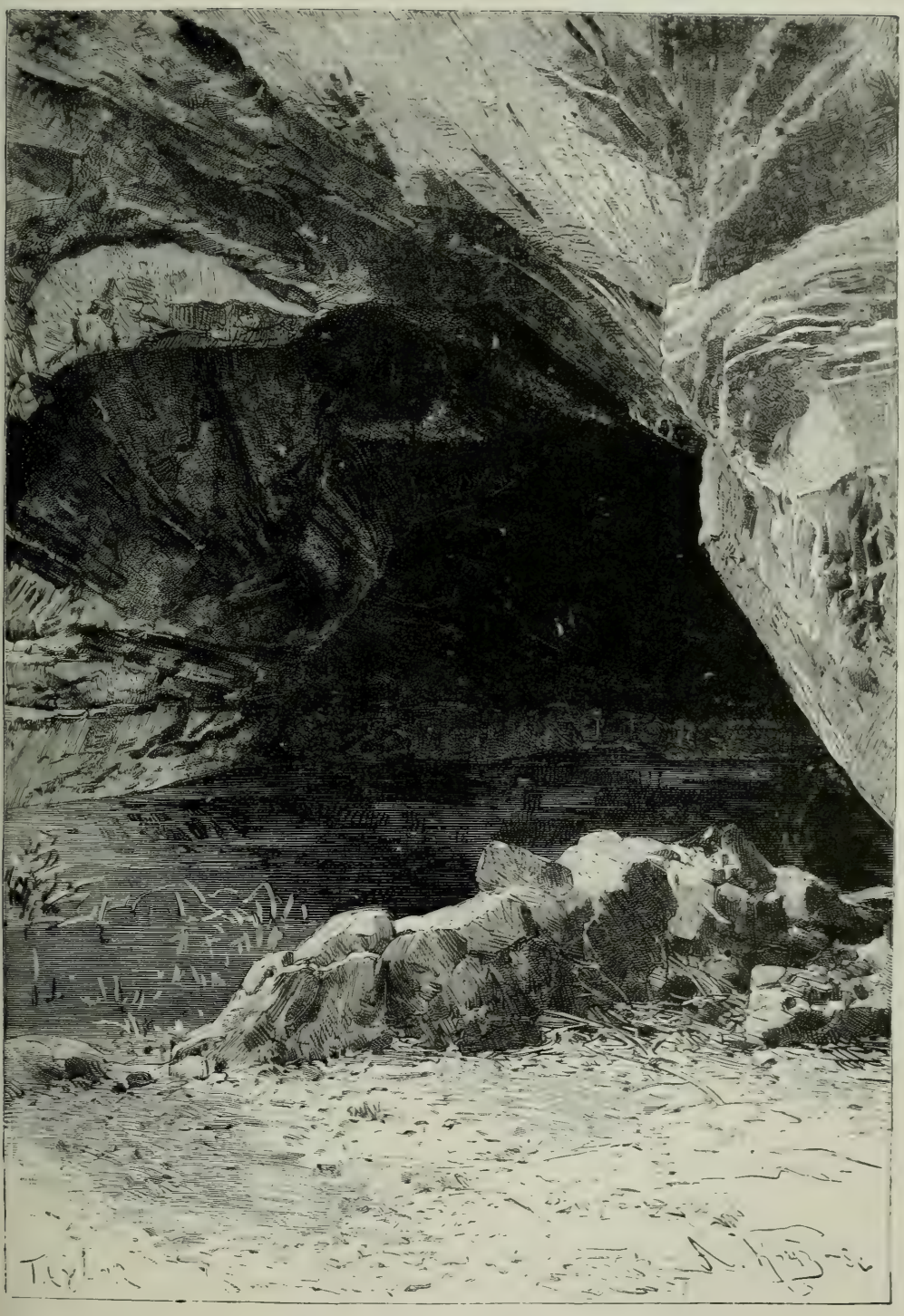
In its geographic features the valley of the Great Lakes is the most peculiar, and as yet unexplained, basin of the North American continent. Its eminent singularity consists in the fact that on the southern and western borders the divides which separate its waters from those of the neighboring river valleys are singularly low and imperfectly defined. In the springtime, when the rivers and lakes are full, it is possible to pass with very small portages by means of a canoe from the head-waters of Lake Superior into the valley of the Red River of the North; and from the southern end of Lake Michigan a slight excavation would lead the waters of that basin into an affluent of the Mississippi. All along the southern margin to the source of the Mohawk in New York State there are low divides over which there is rea-

son to suspect the drainage of this district from time to time in the past, especially in the closing stages of the Glacial period, found its way into the sea. A portion of the northern barrier of this basin, that which lies beyond the north shore of Lake Superior, also lacks the accent which we usually find in the divisions between the drainages of great rivers. It is possible to pass from Lake Superior through the streams which flow into it from the north to the divide which separates the basin from Hudson's Sea, and thence by small portages to enter the streams which fall into the Arctic Ocean.



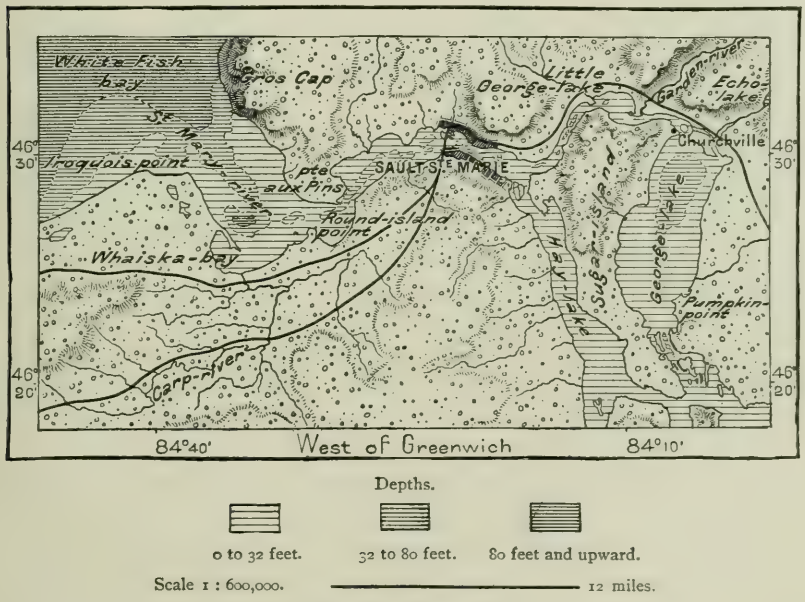
Region about Chicago before the foundation of the city.

Although the valley of the Great Lakes occupies a large extent of territory, these fresh-water seas cover so great a portion of its surface that the dry land which remains occupies a relatively small part of the area. In general, the strip of country bordering the lake-shore and draining toward the basins has a width of less than one hundred miles. On this account, and also because of the relatively slight rainfall, the rivers of this district are all shallow and essentially unnavigable to modern craft, though in the early days of the country, when



Source of the Kanab Wash, Colorado River.

the hand-propelled boats were of small size, they were useful in the infant commerce. The lakes themselves now afford the most important means of water communication in our inland trade except the ways of the Mississippi River system. By means of the Welland Canal, and that which leads by the rapids of the St. Lawrence, and the similar way which connects Lake Superior with the lower waters of the other Great Lakes at the Sault Sainte Marie, ships of large size can now pass from Duluth, at the head of Lake Superior, to the broad waters of the Atlantic. Thus, although these inland seas are parted from the ocean by falls and rapids, they are now, in a commercial sense, united with the broad waters of the sea. Unfortunately for their fullest use, they are generally ice-bound for nearly half the year.



Sault Sainte-Marie.

The northern shores of the Great Lakes lie on the extreme confines of the country which, owing to its climate, is fit for the uses of civilization. It is, on the average, less than a hundred miles beyond the northern shore of these seas that we find the arctic limit, beyond which the fields will not produce an adequate return. In the summer season, when the winds are from the southward versant, this Canadian portion of the district has the air somewhat moistened by the evaporation of the lakes

over which the winds blow. The southern border of the lakes is very considerably affected throughout the growing season by its nearness to these large bodies of fresh water. From the time when the ice disappears in the spring until it returns in the later autumn the winds from the northward have their temperature much modified in their passage over the water. They are thereby somewhat warmed and to a considerable extent moistened. The result is, that the climate in the summer season is made cooler and more humid than it would otherwise be. This effect is most conspicuous in the State of Michigan, the area of which is made up of peninsulas. The climate of this State has an almost maritime character during the season when the lakes are not frozen, and when the winds are prevailingly from over their surfaces.

The soils of the Great Lake district are usually of an excellent quality. They are altogether formed upon deposits of drift material, which is generally of a nature to afford the mineral substances required by the vegetation. The greater portion of the soil is of a clayey nature, but in certain districts, particularly in the lower peninsula of Michigan, extensive deposits of sand, such as are formed by the *débris* washed out by the subglacial streams from beneath an ice-sheet, occupy considerable areas, and afford an earth which for agricultural purposes is of a rather inferior quality. The soils north of the Great Lakes are to a great extent composed of the *débris* worn by the glacier from the crystalline rocks, and has therefore, in general, the character of the New England soil, being rather bowldery and difficult to make ready for tillage, but remarkably enduring to the tax of agriculture. On the southern shores of the basin bowlders are relatively rare and seldom obstruct the plow, but the clay element is often rather excessive, and the soils in consequence are often extremely wet.

Excepting for the basin of Lake Superior, where only the forage crops, certain roots, and some of the hardier grains afford fair returns, the shore-lands of the Great Lakes are well suited to all the staple crops which are grown in the northern part of the United States. Indian corn, a plant which requires a tolerably long summer and a high temperature for its full development, succeeds well along the southern borders of these waters. Certain selected varieties of the same grain, which are able to ripen their ears in about a hundred days from the time of planting, do well in the Canadian part of the country which borders on Lakes Erie and Ontario. The hardier fruits succeed throughout the district, and even the more delicate species, such as grapes and

peaches, flourish exceedingly well in the Michigan peninsula and the section south of Lake Erie. Their success in this field is largely due to the fact that late spring frosts are, owing to the fogs from the lakes, as well as to the warmth which their open water secures, prevented from occurring as frequently as in other parts of the country which are not thus protected from such accidents of climate.

The original forests of this district were generally of excellent quality. The white pine in particular attains in the district of the lower Michigan peninsula, and along a part of the shores of the lower lakes, a size and perfection of timber unequaled save in the woods of northern New England. So, too, the hemlock, a tree which demands a considerable amount of moisture in the air, attains its best development in this district. The general effect of the lakes upon the forest in its primitive condition was to increase the growth in the inland district of the continent, especially to limit the eastward extension of the prairies, these treeless plains becoming more or less broken up with woodlands in the section south of the Great Lakes, and disappearing in Ohio, where the moisture of the climate along the border of the lake is too great to permit of serious forest fires, save in very exceptional seasons. The same influence arising from the moisture of the air promotes the growth of certain cultivated plants in the district bordering on these lakes; thus the hop-vine, which succeeds very well in the moist climate of England, where the air is kept humid by the neighboring seas, does not generally do well in our dry American climate. It finds, however, a suitable station in the region south of Lakes Erie and Ontario, where the dry northwest winds have their character qualified by their journey over these extensive bodies of water. It is a noteworthy fact, that the nurserymen who grow trees from seed to a size fit for planting find the region south of Lake Ontario excellently well adapted to their needs. So, too, the district south of Erie, in Michigan, has been found similarly advantageous for this use, though in a less conspicuous degree. All the forage crops likewise feel the influence of the humid air, and attain a development unusual in the interior parts of the continent.

The subterranean sources of wealth in this field, the value of which has been well proved by extensive mining operations, include iron, copper, lead, silver, and salt. Of these, the iron and copper are by far the most valuable. The iron district, as well as that containing copper, lies almost altogether about the head

of Lake Superior and in the district between that section and the northwestern border of Lake Michigan. These ores of iron are found principally in the two forms of magnetic iron oxide and hematite. Both these metals occur in deposits of unusual thickness and of remarkable purity. The deposits of magnetic ore are limited to the highly metamorphosed rocks in the western portion of the upper peninsula of Michigan, and to the fields underlaid by strata of similar age, which lie to the north and northwest of the head of the lake.* The deposits in this region have been worked for more than a score of years, and the mining operations have revealed bodies of ore of surprising richness and purity. No other known region on this continent has an equally extensive accumulation of the ores of this metal, and in none other is the material so free from deleterious admixtures, such as sulphur, phosphorus, or titanium. The region to the north of the lake, though as yet imperfectly explored, is known to contain ores of iron which are even richer and more abundant than those which occur on the southern border of the lake.

Next, and hardly second in value to the iron ores of this district, come the deposits of copper. These are practically limited to the central and western portion of the upper peninsula of Michigan. The copper ores of Michigan are peculiar in the fact that the metal generally occurs in its metallic state. In all the other great copper-producing districts of this and foreign countries the material is found in chemical combination with various substances, forming pyrites or carbonates, combinations which have to be broken up in the furnace or by means of other appliances before the metal can be obtained. In the Lake Superior district the most valuable deposits are found in the conglomerate or pebbly bed where the metal occurs lodged between the bits of rocky matter. Very similar accumulations occur in the same district where the metal has been packed in between the grains of a volcanic ash. In this latter mode of occurrence the copper is often found aggregated into great masses of a sheetlike form, which often weigh many tons. Owing, however, to the fact that these great masses have to be laboriously cut up by means of hammers and chisels before they can be taken from the mine, it has been found more profitable to work the beds, where the copper exists in the form of small fragments to the amount of from five to ten per cent

* The Lake Superior iron mines produced, in 1887, 4,738,903 long tons of iron—nearly double the production of 1884, and more than one half of the total output of the country.

of the mass, than to extract these occasional solid accumulations.

The silver-bearing ores of this district occur in two diverse forms. From the region north of the Sault Ste. Marie eastward, through a large part of the province of Ontario, veins of galena are found which are of considerable size and occasionally contain a noteworthy admixture of silver. At present these veins can not be profitably worked, for the reason that the tariff on lead excludes the product from the markets of the United States. With a free commercial intercourse between these two parts of the continent, which only man has put asunder, the lead mines of this district could probably be worked to advantage, and would afford a certain amount of silver as a by-product. Silver in the metallic form occasionally occurs in the copper-bearing district of Lake Superior and on the Canadian shore to the northward. In the rocks near the copper mines, sometimes amid the deposits of that metal which occur in the beds of volcanic ash, this metallic silver affords beautiful branched shapes of the metal. Some of these very local accumulations are so rich that from spaces of a few cubic yards many thousand dollars' worth of silver have from time to time been obtained. The Silver Eylet mine, near the north shore of Lake Superior, afforded from a larger but similarly limited aggregation of metallic silver a very profitable return to a mining company. Notwithstanding the occasional occurrence of these very rich though limited deposits of silver there is no reason to expect that the lake district will ever afford an important supply of this metal.

North of Lake Ontario, particularly in the section immediately east and north of Kingston, there are numerous vein deposits of a crystallized lime phosphate known as apatite. Although the mines which have been worked for this substance have hitherto proved fairly profitable, recent discoveries of other and cheaper sources of supply make it unlikely that they are hereafter to afford adequate returns. In the same district occur, in close association with the deposits of apatite, numerous localities which afford an excellent quality of mica. This transparent mineral, which easily splits into thin films, has, it is true, a certain limited use in the arts; but the market for the substance is not increasing, and the supply from the mines in New England and in North Carolina already exceeds the demand.

In the section about Lake Huron and along the southeastern shore of Lake Erie there are extensive deposits of rock salt. Al-

though these saliferous fields are imperfectly explored, it seems probable that they contain very large stores of this substance. These deposits occur in a field which extends from the headwaters of the Mohawk River westward to the lower peninsula of Michigan.* No other large bodies of rock salt which are known to exist in North America are so well placed for commercial use as these which lie in the drainage basin of the Great Lakes. The only deposits which may be compared with them, as regards their extent or the ease with which they may be worked, are the singular accumulations which occur on the northern edge of the Gulf of Mexico in western Louisiana.

As regards its healthfulness, the district of the Great Lakes is one of the most satisfactory sections of the continent. No portion of its area is to any considerable extent subject to malarial fever. The region has never been invaded by yellow fever; and the other forms of contagious diseases which affect men are not more serious in this district than in the other northern parts of the inhabited portion of the continent.

The population of this district is mainly derived from northern Europe. In the province of Ontario is an admixture of French blood, partly a survival from the old colonial days when the French carried on an extensive trade with the Indians. This French element is to a considerable extent commingled with the native races, it having been the habit of the Gallic peoples to intermarry with the Indians. During the slaveholding times of this country many negro refugees from the States south of the Ohio River gathered in the part of Canada which lies to the north of Lake Erie. Although this essentially foreign population has not increased in its northern home, their descendants constitute a notable part of the people in several townships, and are particularly interesting for the reason that they have successfully endured the very strenuous winters of this district in some cases for three generations. There is probably no other case in the world where a folk of tropical origin have been transplanted to as frigid a climate as that to which these negroes are exposed. The fact that they have endured it tolerably well is one of the many evidences of the vigor and accommodative power of the African races. The people of north European blood, who occupy this basin to the exclusion of almost all other folk, appear throughout to find its conditions admirably suited to their needs.

* In 1887, 3,944,309 barrels of salt came from Michigan, and 2,353,560 barrels from New York, and the total product of the country was 7,831,962 barrels.

The purest English population lies upon the northern shores of Lakes Erie and Ontario; much of it has been upon the soil for three quarters of a century, and its admirable condition shows clearly that the English race has nothing to fear from exposure to this strenuous climate. The southern portion of the lake basin in western New York, northern Ohio, Illinois, and Indiana, in western Wisconsin and in Michigan, contains perhaps the most promiscuous rural people of north European descent which is found in any part of this country. Those of English ancestry are mostly from the settlements which their people made in New England and New York; but Germans, Scandinavians, Celtic Irish, Polanders, and even Russians, are commingled in the population of the various towns, and have also found a place among the soil-tillers.

All the natural conditions of this district combine to make the shores of its inland seas the seat of great cities. The waters of these basins afford a natural pathway for a large part of the interior commerce of the continent; the mineral resources favor the development of varied manufacturing industries; and the climate is one which animates men to the utmost exercise of their vigor. Except about Lake Superior, which is rather too far north for successful agriculture, the soil is usually fertile, and affords a wide range of the crops and animal products which are suited to distant exports. All these conditions combine to insure to this part of the country exceedingly varied industries, and will enable it to support a denser population than any other section in the northern part of the continent. Next after the Ohio Valley it is the most richly provided by Nature with the material resources of civilization of any of the great divisions of the continent. It is even more fortunate than this district on the south, for the reason that it will never have to deal with the difficulties arising from the presence of a large element of African blood in its population. Perhaps its greatest good fortune consists in the fact that it has relatively little else than north European blood. Notwithstanding some elements of friction with newcomers from Europe, there can be no doubt that all the diversities of race, language, and national motive will shortly become fused into a people of great physical and mental vigor.

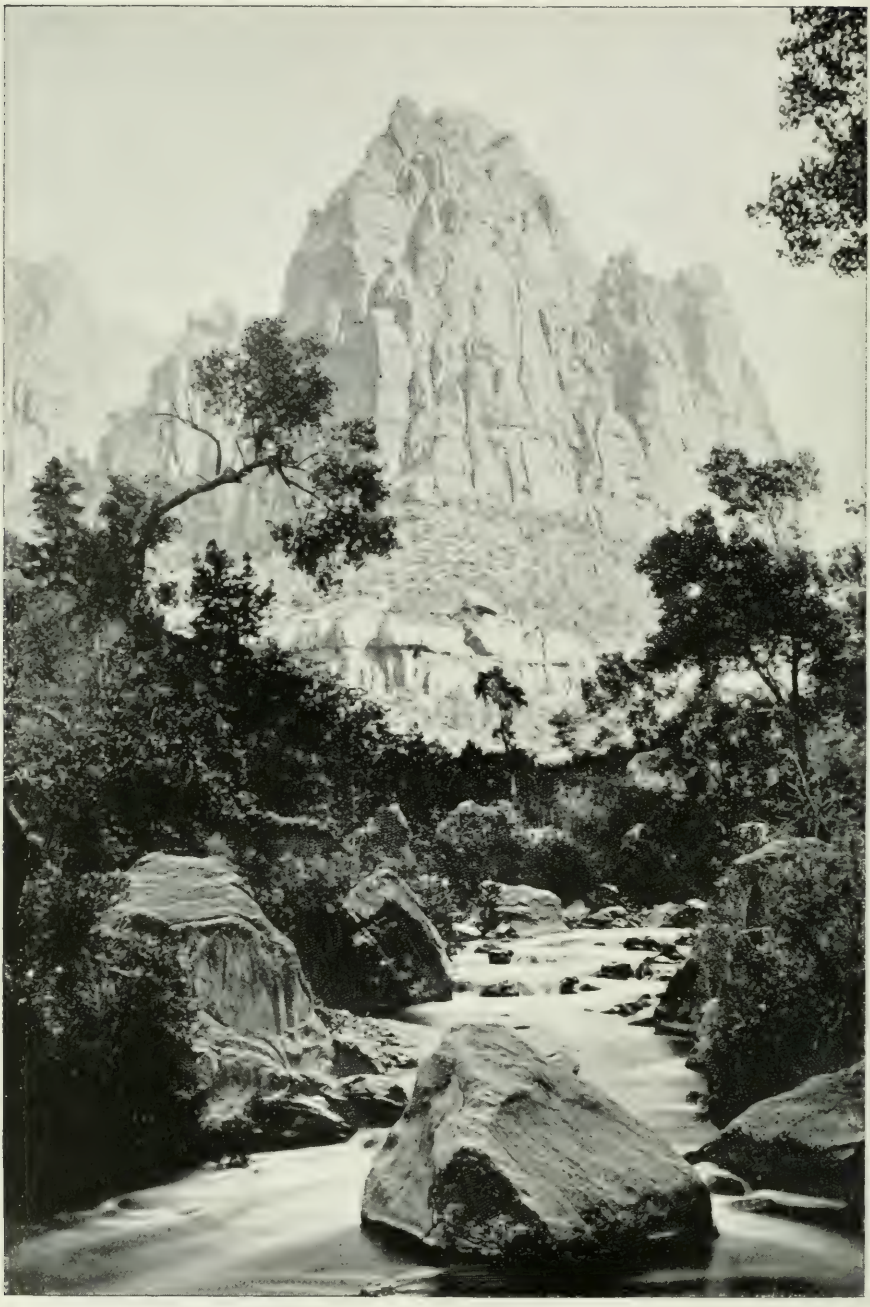
Upper Mississippi District.

In the valley of the upper Mississippi, from the junction of the Missouri River with the so-called main stream northward to the basin of the Red River of the North near the Canada line, we

find a district which has a certain geographic individuality which makes it fit to consider it apart from the other portions of the country. Within this valley lie parts of Minnesota, Wisconsin, Iowa, and Illinois; no one of these States lies altogether in the valley of the upper Mississippi. The whole of this area is in the broad central trough of the continent, in which the underlying rocks have never been to any extent disturbed by the mountain-building forces. On this account its surface is generally of slight inclination; the streams are of gentle descent, except where they pass over the edges of the horizontally outcropping strata; and the divides between the streams are singularly destitute of topographic accent. The barrier between the drainage of the Mississippi and that of Lake Michigan is very slight, and between the waters of this basin and those of the Red River of Canada it is possible in very wet seasons to take a boat without any portage whatever. On the west the division between the waters of the upper Mississippi and those which flow into the Missouri is, at least in the northern part of the divide, of a more distinct character, the tributaries of the two streams heading in a high-lying plain country, which is, however, without any distinct line of either mountains or hills.

Owing to the lack of strong boundaries this valley has no individuality of climate. On the north and west it lies wide open to the invasion of the cold, dry winds from the northern part of the continental interior, and on the south and east to the warmer and relatively moist air from the lower parts of the Mississippi Valley. The range of temperature, as is the case with nearly the whole of the interior district of North America, is very great. In the summer season the hot waves carry the thermometer to near 100° Fahr., and in winter it often descends to 30° below zero on that scale. Owing, however, to the relatively dry air, these variations of heat are less important in their effect upon the economy of the human body than are those of the Atlantic seaboard.

The whole of this region is near the western limit of that part of the continent which is characterized by a somewhat excessive rainfall. The annual precipitation varies from about thirty-five inches in the eastern and southern border of the field to about thirty inches on its western margin. As a whole, the precipitation has a rather better seasonal distribution than in the fields lying to the south and east. The winter rainfall especially, which in most of the districts east of the Mississippi is disadvantageously great, is lessened in this field. On the western border of the valley



Eagle Crag, Rio Virgen, Utah.

of the upper Mississippi the precipitation in the growing season is occasionally insufficient for the fullest development of the tillage crops, but as a whole the agriculture of this part of North America suffers less from climatal accidents than in many other portions of the continent, the occasional losses from drought being compensated for by the exemption from damage due to excessive rainfall in the spring and early summer, such as frequently occurs in the better watered parts of the country. This part of the continent is, along with the other portions of the Mississippi Valley north of the Gulf States, subjected to two peculiar classes of climatal accident: "blizzards," or fierce northwest winds, which occur in the winter season; and tornadoes, which are commonest in the spring and early summer. The violent north winds of the cold season occur at the close of those great circular air movements, the common storms of this country. The air movement in this section is greater than elsewhere, probably in part for the reason that the surface is commonly level and destitute of extensive woods, so that the energy of the motion in the atmosphere is not to any great extent diminished by the friction it encounters in moving over the surface of the earth. In the early condition of the country, when the settlements were detached and the buildings of the farmstead of a frail and insufficient character, these winter winds often led to a considerable loss of life among the people and their domesticated animals. With the progressive improvement in the farm buildings, the extent of this evil is constantly reduced, so that these storms are not likely in the future to be very serious.

The tornadoes which occur on the southeastern part of the advancing front of the ordinary storms are more serious evils. As set forth in the section of this work which treats of American weather, the detailed characteristics of these singular whirlings of the air and their dangers are noted. We will therefore only remark the fact that the loss to life and property which is likely to arise from these calamities will probably increase as the population becomes denser, provided care is not taken, by the use of a proper system of building, to diminish as far as may be the ills which they inflict. When the population has come to organize its constructions with reference to these dangers, they will probably afford much less ground for apprehension than they do at present.

Owing to its high northern position, and the relative clearness of the sky in the summer season, this region is blessed with much

sunshine, which is very advantageous to the health of the people and to the growth of the crops. The dryness of the winter air serves to mitigate the evils arising from the intense cold. Moreover, the temperature in winter is less variable than in the southern parts of the Mississippi Valley—a feature which is due to the fact that the warm winds from the Gulf of Mexico do not often penetrate so far to the north, and when they reach this district have already been much cooled by their long passage over the land.

The soil of this district is throughout stamped by the effects arising from the recent occupation of the country by the glacial sheet. Except an area in southern Wisconsin, which for some unexplained reason was exempt from the tread of the ice, the character of the soil is everywhere more or less affected by the drift coating. In the northern part of the area this sheet of *débris* is commonly thick, and as it is composed to a great extent of waste worn from rocks which contain much lime, it is well suited to afford the mineral substances required for plants. In the southern portion of the field there is a considerable extent of country which is covered by a fine-grained, compact mass, which in the main appears to be made up of silt deposited by the waters which flowed from beneath the glacial sheet. This accumulation, known to geologists by the name of loess, affords soils of excellent quality.

Owing to the fact that there are no mountainous or even very hilly fields in this part of the country, practically all the rock surface, except that which is exposed on the steep escarpments of the river cliffs, is soil-clad and fit for tillage. Owing to its relatively dry climate, the swamp areas are very small; and, except certain fields near the very numerous lakes which occur in the northern part of the district, these limited areas of inundated ground can be easily won to tillage. Probably no other equal area on this continent is as uniformly fit for the plow. Of the dry land more than ninety-nine hundredths is suited to agriculture.

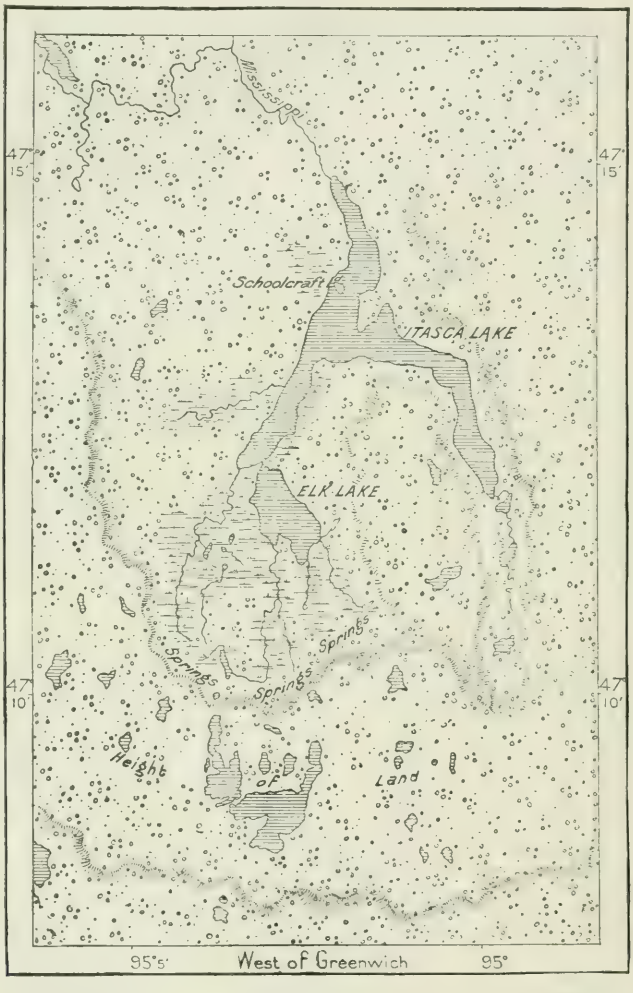
One of the most characteristic features of this section is found in the very numerous small lakes which occupy an extended district in the northern part of the basin, and which likewise occur in great numbers in that part of Wisconsin which slopes toward Lake Michigan. These areas of water owe their existence mainly to the irregular distribution of the *débris* which was left upon the surface at the end of the last Glacial period. The number of these lakes, varying in size from tiny dots of water to those of suf-

ficient dimensions to have some importance in navigation, is to be counted by thousands. They constitute a beautiful feature in the landscape, and are likely to prove of great value as sources of water supply. Owing to the deep and porous nature of the drift coating, the streams which are tributary to the upper Mississippi, though of relatively small size, maintain an unusually uniform flow for a country of such moderate rainfall. Many of them are suited to afford valuable water-power, and the Mississippi at the Falls of St. Anthony, where the water is precipitated over thick beds of the St. Peter's sandstone, affords the most important water-power which has been utilized in the central portion of the United States. A large part of the alluvial land bordering upon the streams of this district is suitably placed for irrigation. Although the climate of this section is not so dry as to make such improvements necessary in order to secure good returns from the field, there can be no doubt that such a system of artificial watering would greatly increase the returns in the way of crops. The vivid sunshine which characterizes this part of the country is, as before noted, very favorable to the growth of all forms of annual vegetation. With the addition of an abundant supply of water, the yield of the fields, especially in all forage crops, would be greatly increased.

The mineral resources of the upper Missouri Valley are limited. In the southwestern section the Iowa coal field * affords some fuel of a tolerable quality for domestic use and for service in producing steam, but which is unsuited for metallurgical purposes, and is indeed so inferior that it is found more advantageous to seek a supply for all but the most ordinary uses from the Pennsylvania deposits or those of southern Illinois. In a considerable part of this territory, occupying a field which includes a portion of western Illinois, eastern Iowa, and southern Wisconsin, deposits of galena or lead sulphide occur in rocks of Silurian age. Forty years ago these accumulations were much worked for metallic lead; but the more extensive fields of the Cordilleran district, where this metal occurs in great plenty, and in association with silver, has made it unprofitable to work the mines of this valley. Certain limestones and sandstones of this district are excellent for building purposes; and the clays of Wisconsin, particularly of the district about Milwaukee, are admirable for making brick. By care in the process of burning, this clay takes on a

* In 1889 Iowa produced 4,061,704 tons of coal.

light yellow color, which is much prized for architectural purposes. The calcareous deposits of the district are also well

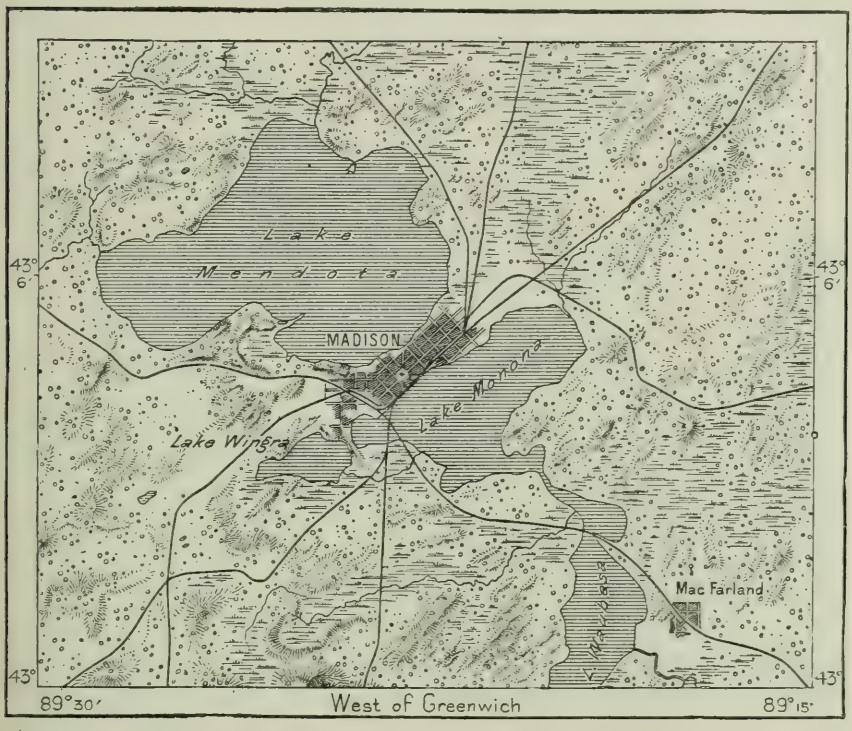


Lake Itasca.

suited for making lime which is to serve either as a cement or for the improvement of the fields.

Nearly the whole of this district lies to the west of the dense forests which are characteristic of the eastern portion of the continent. The western prolongation of the area of the great woods which we have noted as occurring in the valley of the Great

Lakes is continued over a considerable portion of the territory which is occupied by the extreme head-waters of the Mississippi. Owing to this extension a portion of northern Wisconsin and a part of Minnesota are to a great extent forest-clad. The dryness



Scale 1 : 200,000. 3 miles.

Madison, Wisconsin.

of the climate, however, somewhat reduces the dimensions of the timber, and there are many interspaces on the higher lands which are occupied by prairie. Over the greater part of the district the timbered ground is limited to a fringe along the streams and to the humid margins about the lakes. As a whole, the district is prairie ground, but the conditions permit the growth of tree plantations wherever the destructive prairie fires have been rendered impossible by the advance in the cultivation of the soil. It is to this open nature of the country that its marvelously swift settlement has been due. In the portions which have been won to the plow the farmer has had no hindrance in clearing away the woods. The only hindrance to the subjugation of the earth

has arisen from the difficulty of obtaining sufficient wood for architectural purposes and for domestic fireplaces.

In all that relates to the health of its population this section of North America is more favorably conditioned than any other part of the continent, except the southern portion of the Appalachian highlands. The normally dry climate and lack of excessive soil moisture secures a tolerable immunity from tuberculosis, consumption of the lungs, and allied diseases, and a practically perfect exemption from malarial fevers. As regards these two diseases, the region is more favorably situated than any other district of great agricultural resources. Owing, perhaps, in part to the very free movement of the air which is made possible by the absence of hills and forests, contagious maladies of all descriptions appear, for the present at least, to be less serious in this than in any other equally extensive part of the United States where a large population has been gathered together.

Owing to the fact that this district was settled after the full tide of European immigration began to sweep into the western part of the Mississippi Valley, its population is of a very diversified nature. Fortunately, in this as in other parts of the United States the descendants of the English folk have been the pioneers of civilization, and so the framework of society rests upon the masterful element of our population. Nearly the whole of the settlers are of north European blood; some from states which are akin to our own, and which are characterized by social motives which readily fit into the plan of our American life. Here, as elsewhere in this country, alien people, such as the Scandinavians and Germans, have occupied considerable areas to the exclusion of English-speaking people. They naturally endeavor to maintain the languages and customs of their native countries, and for a time in a measure manage to do so; but in no case does it seem likely that they will succeed in preserving their descendants in the essentially foreign state in which we still find many of the German settlements of Pennsylvania. The commingling of the peoples goes on apace, and in fifty years from the present time all these national distinctions will doubtless be effaced.

The peculiarly rapid advance of these Northwestern settlements is undoubtedly due to the singularly perfect organization of the ways by which the people were brought to the country. The waters of the Great Lakes, of the upper Mississippi and of its navigable tributaries, with the aid of cheap steamboats, at once laid open a large portion of the area to settlement, under condi-

The grizzly bear.

tions which permitted the incoming people to bring an abundant store of household comforts with them. The rapid construction of railways, which under our system of Government land grants had their termini generally on the very frontier, afforded a yet more convenient method of access to the land. The prairie character of the surface made it possible for the tillage swiftly to occupy so large a part of the area that the people at once won their way to wealth through their exports of grain and cattle.

Arkansas District.

North of Louisiana and south of the Missouri River lies an extensive district the greater portion of which is drained by the Arkansas and its tributary streams. This district includes a portion of southern Missouri, nearly the whole of Arkansas, and the larger part of the Indian Territory. The portion of this field which is included within the limits of the forest-clad country has a sufficiently distinct nature to deserve separate notice in these pages. As regards the character of its surface, this field is more diversified than any other portion of the central section of the Mississippi Valley. Near the banks of the great river of that name, and along the margins of the Arkansas and the other large streams, the surface is subject to the overflows of the Mississippi in time of flood, and has the peculiar character of the delta lands of that remarkable district. In the central portion of the field the singularly detached mountain systems of the Ozark and the similar heights in the Indian Territory attain the height of two thousand feet or more, and afford greater elevations than are found anywhere else in the central portion of the great continental valley. These remarkable outlying mountains extend northward into Missouri and southward to the margin of Texas, and constitute the most noteworthy feature of this district.

The soils of this field present a somewhat singular variety. Along the greater waterways the land is of a completely alluvial character, and where not protected by dikes is liable to overflows from the rivers during the planting season. These delta fields are of extraordinary fertility, and are almost inexhaustible by tillage. Where they become impoverished it is easy to restore them to their pristine state by permitting the flood waters to have access to their areas. In a single season a deposit of mud will thus be formed which is often several inches in depth and exceedingly rich. On the extensive areas of plain land and low, rolling hills, the process of decay of the bed rocks has in most

cases produced a deep soil, which in its primitive state is very fertile, and which is tolerably enduring to tillage, save where the process is of the most reckless nature. The mountain section, owing to the enduring nature of the rocks to atmospheric decay, generally affords a poor soil—the earth, except in the valleys, being generally fit only for the growth of timber. As we pass beyond the forest district and enter upon the great region of the Cordilleran plateau, which is afterward to be described, the soil becomes more fertile, but the rapid diminution in the rainfall makes it less fit for agriculture.

Owing to its nearness to the Gulf of Mexico—the warmth-giving sea of the continent—the climate of this district has a southern cast. In the summer season the temperature is tropical, and the frostless portion of the year continues for about six months. In the winter, during the times when the strong northerly winds prevail, the thermometer may fall to the zero point, but the frosts, except in the section of the area which lies in the State of Missouri, are usually of very brief duration. All the winds between west and northeast, around by the south, bring in a few hours a temperature which is much above the freezing point. In general, the climate may be described as that common to the district about the Gulf of Mexico, with more continuous and vigorous invasions of the northern cold. In this region the rate of diminution in the rainfall from east to west takes place with greater rapidity than in the more central portion of the continent. Near the Mississippi the average precipitation exceeds sixty inches; on the margin of the forest belt which we have regarded as the western border of the district the annual rainfall is less than half this quantity.

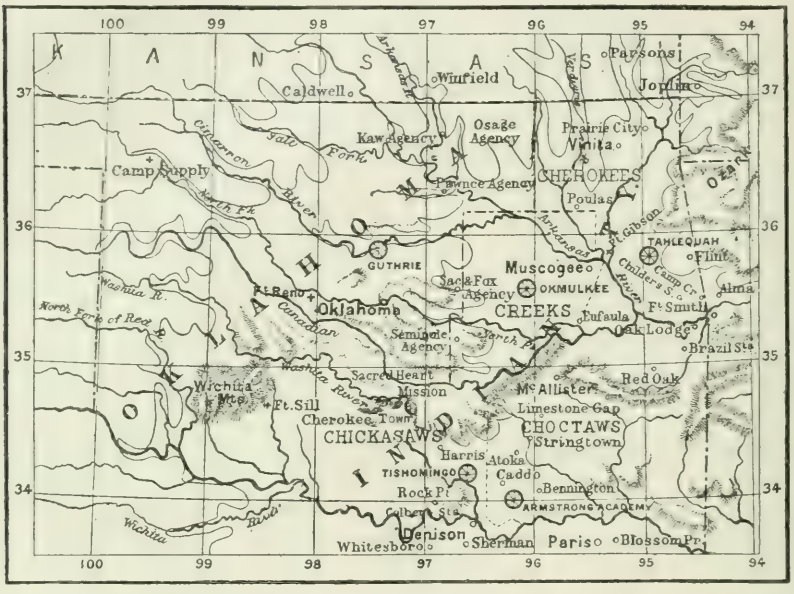
On the alluvial and low uplands in the eastern part of this district the forests exhibit an extraordinarily vigorous growth. The leading species of trees of the great Appalachian woodland maintain their full vigor of growth nearer to the margin of the forest in this district than in any other part of the United States. This fact serves to show how far the development of these forests depends upon the rainfall. The white oak and Southern pine are still at their best in the eastern portion of this field. The tulip tree attains very nearly its full dimensions. In the swamps of the alluvial lands the taxodium, or bald cypress, is in its perfection. The beeches, black walnuts, and the chestnuts are less well developed, and do not appear to find in this territory a fit field for their growth. Certain species, such as the holly, the osage

orange, and the pecan, which do not exist or are scantily found in the more eastern and northern portions of the country, attain their fullest growth in these Arkansas woods. A peculiar advantage of these forests consists in the fact that, along with those in the neighboring fields of western Louisiana and eastern Texas, they are the nearest woodlands rich in construction timbers to the open plain country to the south of the river Platte, and it is from this forest field that the southern portion of the Cordilleran plains will naturally draw its construction timber.

The agriculture of this district, owing to the as yet unsettled character of a large part of the surface, has not yet assumed, save on the alluvial land, a very definite shape. The delta district is to a great extent devoted to the growth of cotton and of maize. The soil is almost too fertile for the growth of the small grains, for the reason that the stems are excessively rank, and the crop is liable to be overturned by the winds. Much of the upland is also devoted to cotton culture; but the soil, like that of north Mississippi on the east, becomes rapidly exhausted by this crop, and where the inclinations of the surface are of even moderate declivity the earth rapidly washes into the streams. The fertile lands on the western border of the district are excellent for the growth of small grains, and afford fair crops of Indian corn. All the ordinary American fruits succeed well in this area. As a whole, the agricultural resources of this section of the United States may be considered good.

As regards the liability to disease in man and his domesticated animals, this region exhibits great diversities. All the alluvial district, and even the borders of the small streams, are subjected to ague. These alluvial lands, at least in the vicinity of the Mississippi, lie also in the path of the invasions of yellow fever. In the upland district of this territory the climatal conditions appear to be thoroughly wholesome. Although statistical evidence on this point is, on account of the newness of the settlements, as yet wanting, we may safely assume that the drier western portion of the area near the forest margin will prove as salubrious as they have been shown to be in the neighboring portions of Texas and of Missouri. The horned cattle in the southwestern section of the United States, the plain area upon which this district borders, have shown a liability to two or three forms of contagious diseases of a serious nature. It does not seem likely, however, that these maladies will prove destructive to the interests of the farmers in the Arkansas district. The development of the dis-

eases appears to be fostered, or at least their wide extension brought about, by the custom of keeping these animals in large herds, which are fed on ranges of the open country. In no part of the timbered district of the United States have the flocks and herds become seriously affected by these plagues.



Scale 1 : 6,000,000. ——— 124 miles.

Oklahoma and Indian Territory in 1892.

The condition of the population in the Arkansas district is much affected by the fact that the Indian Territory, whereupon the Government has gathered a large body of the aboriginal population, occupies a considerable part of its area. These native folk have to a certain extent become civilized ; they till the soil, have organized their society so that it bears a semblance to our own, and are thus definitely and firmly placed on the ground which they inhabit. Whether the whole of this great reservation remains set apart for the uses of the Indians alone or not, there can be no doubt that for a century to come the upper part of the Arkansas Valley, and the neighboring portion of the drainage system of the Red River on the boundary of Texas, will contain a large and comparatively pure body of Indian folk.

Outside of the Indian reservation the population of this district consists mainly of whites derived from the English colonists

of the Virginia group of States and of Africans. Besides the descendants from the Southern English settlements, this field also contains a considerable population which came from the mongrel colonies of eastern North Carolina. Following the general law of the distribution of American population, the folk from the Albemarle and Pamlico settlements have drifted westward through western North Carolina, southern Kentucky, and Tennessee, and have gathered in the backwoods districts of the Arkansas area, where they are perhaps more abundant than in any other section of the country. They are, as a class, indolent and shiftless; not without fine qualities, but, unfortunately, their inheritances do not include the thrift and foresight which are required of the American citizen. The richer lands of Arkansas are mainly occupied by the descendants of the plantation people of the slaveholding days. This part of the Southern population always afforded excellent material for the needs of a State.

In the portion of this district lying immediately west of the alluvial lands there is a considerable body of population which has found its way into the country from the Northern part of the United States—from New England and New York, and from the secondary settlements of the Ohio Valley and lake district, which were peopled from those parts of the Atlantic seaboard. This admixture promises to be of great importance in the future development of this field. The African element is practically limited to the lower lying country in the eastern and central portions of the State. Here, as elsewhere in the South, the negro population has shown little disposition to extend into districts which were not in the slaveholding time occupied by their race. This lack of desire to venture into new fields is probably due in part to the home-loving spirit of the people, and in part to the fact that they are indisposed to change the habits of labor which they have formed in the culture of particular crops. Such changes are difficult for enterprising people to accomplish, and these relatively unintellectual folk are exceedingly inclined to adhere to traditional usages. Except for the lower grade of Southern whites and the Indian population of this country, the folk compare favorably with those occupying any part of the area west of the Mississippi River. Owing to the lack of immigration from continental Europe, the whites of this district are of nearly pure English descent.

The mineral resources of this district exhibit certain eminent peculiarities. In the district of the White River of Arkansas

there are extensive deposits of the mineral known as *pyrolusite*, or oxide of manganese,* an ore which has great value in the arts, in part for the manufacture of bleaching powders and in part for admixture with pig iron in making Bessemer steel. Although the production of manganese in this district has but just begun, there is every reason to believe that it is likely to become the most important seat of the mining of this substance in the country. The iron ores of this field consist in part of the ordinary forms of the brown ores; but one of the most interesting localities of magnetic oxides which have been worked for the American market lies in the Iron Mountain district of southern Missouri. These mines for many years afforded a large product of exceptional purity; but the richer parts of the accumulation have become exhausted, so that the ore no longer plays an important part in the production of pig iron.

There are some coal beds which afford a tolerable quality of fuel for domestic purposes in the Indian Territory, and it seems likely that this field is continued to the northward into Arkansas. Unfortunately, these deposits are not suited for metallurgical purposes. As yet, but little is known concerning the area and resources of this coal field, but as it seems a general law that all the carboniferous deposits lying to the west of the Mississippi River afford only irregular, thin-bedded and rather ashy coal, there seems no reason to hope that any important discoveries of fossil fuel will be made in this field. Fortunately for the interests of this country, the Alabama coal field, whence a tolerable fuel for ore-smelting can be obtained, lies at a distance of about three hundred miles to the east of this district, and the higher grade coal of eastern Kentucky is less than five hundred miles away.

The most peculiar mineral resource of this district consists in the singular variety of rock known as *novaculite*, which affords a remarkably good material for sharpening the edges of tools.† This whetstone district occupies an area of many hundred square miles in extent, the rocks appearing in the singularly sharp ridges of the mountains which occur from the Hot Springs district southward. There is already a considerable market for the whetstones made of this material, and it seems likely, from its

* Arkansas produced, in 1889, 2,528 long tons of manganese.

† Eight hundred and fourteen tons of whetstone were produced from Arkansas in 1889. Although this is but about one fourth part of the total output in tons from the country at large, owing to the good quality of the stone it is in money value two thirds of the total output.

Falls of the Yellowstone, Wyoming, in winter.

exceeding purity and the ease with which it may be quarried, that a very large and profitable industry may be founded upon this stone.* Among the curious geologic features of this district may be noted the remarkable hot springs, the waters of which are of singular purity, which find their way to the surface in a little valley at the town of Hot Springs. These waters have won a great reputation in the treatment of rheumatism and other constitutional diseases; they may, indeed, be reckoned as among the most valuable therapeutic waters of this country. Some silver ores occur in the crystalline rock of central Arkansas, along with deposits of lead. Although a good deal of money has been spent in their exploration, no economic success has been attained. It therefore seems doubtful whether they have any value.

Lower Missouri District.

That portion of the Missouri Valley which lies within the timbered district constitutes the geographic field which, though less distinctly separated from the other parts of the country than those we have previously considered, has a certain measure of individuality. It includes the larger part of the State of Missouri, and may be regarded as also including the western portion of Iowa and a part of Kansas and Nebraska. In general it may be said to contain all that part of the Missouri Valley in which the rainfall is amply sufficient for the whole range of our northern agricultural crops, and where severe droughts during the growing season are exceptional accidents which do not have to be reckoned on as in the expected order of Nature. The surface of this district, lying altogether upon the little disturbed rocks of the central trough of the continent, exhibits little variety such as is given by mountains or great hills. It is, in fact, a portion of the great flat floor of the continent in the lower part of the decline between the Appalachians on the east and the Cordilleras on the west. Into this level country the main channel of the Missouri has cut a broad valley, and each of its tributaries has carved a less conspicuous trough.

The soil of this district has in the main been derived from the immediately underlying rocks. North of the Missouri River there is here and there a thin coating of *débris*, which is due to the fact that for a brief period the ice-sheet overlaid a portion of the sur-

* The value of the novaculite produced in the United States in 1889 was $32,980, while in 1890 it was $69,909.

face. South of that stream, particularly in the more western portion of the area, a considerable part of the surface is covered by a deposit known as loess, a compact mixture of fine sand and clay without distinct stratification, and which has become cemented to about the hardness of sun-baked brick. It is supposed that this layer, which often attains a thickness of thirty feet or more, was formed in front of the glacier, probably at a time when the surface of the country lay at a much lower level than at present, so that the water of the melting ice was not readily drained away into the sea. Owing to the prevalence of limestone rocks in this district, and to the general slight slope of the soil toward the stream, the layer of detritus which is suited to the uses of plants is remarkably thick. No other portion of the continent, except perhaps the region of the upper Mississippi, is occupied by so uniformly fertile soil. Probably less than a hundredth part of the area is unfit for plow tillage. As in all the regions south of the glaciated belt, the quality of the soil depends in a general way upon the nature of the subjacent rock. Where this is of a limy nature, the covering is uniformly fitted to give large crop returns; where it is of a sandy nature, the resulting detritus is less fertile. Owing to the depth of the detrital layer, the fields of this district are enduring to tillage. The prevailing absence of steep slopes protects the earth from the considerable damage which in the section east of the Mississippi so commonly arises from the washing away of the friable material in the times of excessive rainfall.

Owing to its central position, and the wide, open nature of the country about it, this region is subjected to great alternations of temperature and moisture. The effect of its neighborhood to the Gulf of Mexico is to give the south winds a large amount of warmth and moisture, while the air from the north and west is usually dry and cold. The influence of the moisture-laden airs from the south is most distinct in southern Missouri, where the rainfall on the average exceeds forty-five inches. From that part of the field the share of rain steadily diminishes at a pretty rapid rate until the parallel of the hundredth meridian is attained, when there is so little rainfall in the growing season that the crops are untrustworthy. The same lessening of the rainfall occurs to the northward, so that near the northern boundary of Nebraska and of Iowa we enter upon a country which is properly to be termed arid. The passage from the well-watered country to that of scanty moisture is gradual, and no distinct line can be drawn

between the two districts; but in a belt which has a width of about a hundred miles on the western and northern border of this field we pass from a region where destructive droughts are exceptional calamities, on which the farmer may not be called upon to reckon, to a more western field where such accidents are of frequent occurrence; where, indeed, in each ten years there are commonly several seasons in which the crops fail from lack of rain.

The temperature of this area is almost as variable as the amount of its water supply. In eastern Missouri the summer heat is great, and the growing season is prolonged to the extent that even cotton may be profitably reared. In the winter the frosts are occasional, and traces of the spring-time are shown by the growth of certain forms of vegetation as early as the middle of February. In Kansas, Nebraska, and southern Iowa the summers are shorter, the frosts come much earlier in the autumn, and the winter, though occasionally broken by long periods of thaw, is of a tolerably steadfast nature. As a whole, the soil and climate of this region are admirably suited to agriculture. The laboring season is relatively long, and the snowfall is so small that open-air work is possible during a large part of the winter-time.

The great eastern forest of North America is still found in tolerable luxuriance in the portions of Missouri which border on the Mississippi River. From a relatively narrow belt along this stream this woodland rapidly wanes to the westward, so that more than four fifths of the district may be regarded as beyond the great timber land of the Appalachian district. The passage from the district of solid woods to the open country is somewhat gradual. Strips of woodland continue up the margins of the streams and occupy the moister ground of the uplands, the area and continuity of the growth gradually diminishing as we go westward, until a narrow belt of scattered cottonwoods, willows, and other water-loving trees which border the water-courses is all that remains of arboreal vegetation. It seems probable that the present deforested condition of this country has been recently brought about through the action of fires which swept through the dry prairie grasses and destroyed the trees in the drier parts of the woods. In all portions of the field a considerable number of species of our forest trees will, when planted, grow readily and attain tolerable dimensions. Without the interference of man, and with security against the ravages of fire, the whole of this district would probably return in the course of a few centuries to its originally timbered state.

The crops of this country include a rather wider range than is produced from any other similarly extensive district within the United States. All the American grains except rice are admirably suited to the conditions which this field affords. Over all, except the most northern and western portions of the tract, tobacco of the coarser grades can be grown. In the southeastern portion of the area the growing season is sufficiently long for the cultivation of cotton, a crop which requires rather more than six months of summer between the seedtime and the end of the long harvest. All the root and garden crops of the northern zone are successfully reared, and nearly the whole of the territory is suited to our arboreal fruits, such as the peach, the pear, and the apple. Owing to the prevailing dryness of the climate and the long summer season, the grape does well on the thinner soils of this district.

As is usual with regions where the underlying rocks have not been disturbed by the mountain-building forces, this district exhibits a comparatively limited range of mineral stores. The mining resources of this district are practically limited to certain small areas of coal, mostly lying in the central portion of Missouri,* and to extensive deposits of lead and zinc ores which occur in the southern portion of the same State. The coals of this field, as is usual with those deposits between the path of the main Mississippi River and the Rocky Mountains, are mostly of pure quality and occur in very irregular accumulations. Their only use is for domestic supply, and in a small way for steaming purposes. They are not likely to play any important part in the economic history of the district. The deposits of zinc and lead in the Joplin district of Missouri are of great extent; they are extremely rich, and are easily mined. Were it not for the competition with the Cordilleran mines, where these metals are obtained from ores which are in the main sought for the silver which they contain, these Missouri mines would be of extraordinary value. Notwithstanding the large supplies of lead which are produced as a by-product in the territory of the west, the Joplin mines are very profitable. They constitute one of the most important sources of supply of these metals which is known in the world.†

The population of this district consists in the main of those of

* The census of 1890 states the output of coal of the preceding year from this area to be 2,567,823 tons.

† As a lead-producing region this ranked next to Colorado in 1889, affording 44,482 short tons; while as a zinc-yielding region it has first rank in this country, producing 93,131 short tons.

English blood, derived in almost equal numbers from the Virginia group of colonies and from those to the north of Chesapeake Bay. The African element of the population is small, and is practically limited to the eastern portion of Missouri. The native negroes of this field were almost altogether derived from Virginia, and are thus from the part of the black population which has been longest upon the soil and has partaken in the largest measure of the civilizing influences which this country has afforded them. Non-English people are mainly of German stock, and these Teutons are so completely intermingled with the other whites that the perfect fusion of the population is assured. The portion of this district which lies in eastern Missouri is among the oldest settled parts of the Mississippi Valley. The French founded a station here in 1720, and in 1775 St. Louis had a population of eight hundred people. Around this station, immigrants, mainly from Kentucky, rapidly gathered after the cession of the Territory of Louisiana to the United States. Thus for many years eastern Missouri was the outpost of our civilization west of the Mississippi River. The greater portion of Missouri has been occupied by the extension of this colony, which owed its origin to the folk derived from the Virginia group of settlements. The western and southern parts of this district have in the main been peopled from the States which did not hold slaves. With the destruction of that institution the original causes of conflict between the folk of the ancient settlement and the newcomers in Kansas, Nebraska, and Iowa has entirely disappeared. The result is, that the district is occupied by a remarkably homogeneous body of people. Southern Missouri contains an element of the low-grade Southern whites, a material from which it is difficult to make a good citizen; but the numbers of these people are small, and thus, as a whole, the district has as satisfactory a population as the continent contains.

District of the Upper Missouri.

The portion of the upper Missouri Valley which lies to the north of the junction of the Niobrara River and to the east of the Yellowstone includes the two States known as North and South Dakota. A small portion of the drainage of North Dakota descends toward Lake Winnipeg and thence to Hudson Bay. The greater portion of this area of the upper Missouri drainage has the level nature which belongs to the great continental valley. In the southeastern portion of the field the spurs of the Black

Hills give a somewhat mountainous character to the surface, but nearly the whole of it belongs to the plain-land region of the continent. Although generally level, the surface is on the average at a greater altitude above the sea than any of the districts which we have heretofore considered. Its average elevation increases gradually from the southeast to the northwest. In the southwestern section of the area, where the streams descend rapidly toward the Missouri and have cut their way through easily eroded deposits of Tertiary age, the country is rudely intersected by the stream valleys. Over the larger portion of the area, however, the valleys have gentle slopes toward the streams which drain them. The divide which separates the waters of the upper Missouri from the streams which flow toward Lake Winnipeg is indistinct, the neutral ground between the two systems of waters having a tolerably level surface.

In the western and northern section of this field the character of the soil is determined by the action of the glaciers in the last ice-time. These glaciated soils, owing to the fact that the rocks over which the ice moved are to a great extent limestone, afford abundant mineral matter such as is required by plants. South of the ice front the nature of the soil is to a great extent determined by the character of the immediately underlying deposits. These are generally of a nature to afford by their decay a detrital layer of excellent fertility. If the agricultural value of the country were determined by the mineral elements which are found in the soil, this region would be as fertile as any other portion of the Mississippi Valley.

In this section of the continent the climate prevailingly has the character which is common to the interior districts where the air is relatively little affected by the Atlantic Ocean or the Gulf of Mexico. The rainfall is relatively small and irregular; yet, as a whole, the deposition is more considerable than in the other portions of the table-land area which borders the Rocky Mountains on the east. This is apparently due to the fact that the Cordilleran system is narrower, and on the whole lower, between the parallels which inclose its area than in the more southern portions of that mountain tract. A certain effect on the climate is therefore brought about by the moist airs which drift into the region from the Pacific Ocean.

Owing to the considerable elevation of the greater part of this district, the average annual temperature is rather low, but the cold is less great than would be expected from the latitude and altitude of the surface. The westerly winds which blow over the Rocky Mountains are somewhat warmed by their descent from

View taken in the Bad Lands, Nebraska.

their elevation, to the lower land of the Missouri Valley. They have in general the character of the winds of all mountain countries, where the air climbing the windward slope parts with much of its moisture as it expands in its upward going, and has its heat again made sensible by the compression to which it is subjected when it passes over the crest and descends upon the lower land beyond. Although the winter temperature is moderated by this action, the cold is often intense, at least during the frequent occasions when the winds are from the north and northwest. Inasmuch, however, as the air at such times is exceedingly dry, the effect upon the body is no greater than in the less extreme cold of the eastern part of the United States, where the air is much more humid. In the southern portion of this area the winters, save during the prevalence of the fierce north winds, are relatively mild; on the whole, not more severe than those of central and southern Ohio. Owing to the scant rainfall, the winter snows are of trifling amount, the surface rarely remaining snow-bound for any considerable time. The summer climate of this district is admirable. The heat is mitigated by the elevation, and the air is refreshed by the influence of the mountains on the west. The direct rays of the sun, as in all elevated districts, are very powerful, but the temperature in the shade is never excessively great. This is a region of cloudless skies, the proportion of clear days probably being greater than in any other part of the United States to the east of the Cordilleras.

The agricultural resources of this field are limited only by the amount of rainfall. The growing season is sufficiently long to permit the development of all the common American grains except maize, which does not do well in the northern portion of the field. The development of a forage crop such as hay is also somewhat restricted by the dryness of the climate. In most of the seasons the rainfall is sufficient to nurture all our standard Northern crops. Occasionally, however, there are periods of excessive drought which are exceedingly damaging to the farmer. It seems likely that the difficulties arising from scanty rainfall may be to a considerable extent met by a better adjustment of the crops to the conditions which prevail in the district. It is a noteworthy fact that, when an agricultural people enter upon a field where the soil and climate differ in a considerable measure from those upon which they were reared, they always find much difficulty in adapting their labor to their environment. Slight differences in the particular varieties of plants, variations in the methods of tillage as

regards the depth of plowing, the time of seeding, and the care which is bestowed upon them, may greatly influence the harvests. Much of this area is also suited to simple methods of irrigation, such as may be effected by diverting the waters of the rivers upon the fields, or possibly in a small way by means of water obtained by borings. It seems likely that, by the proper organization of tillage methods, at least three fourths of this extensive district can be made to return profitable harvests, and to maintain the products of the fields with tolerable uniformity. At present the grain of this country has to find its principal market in the eastern portion of the United States. This is, however, but a temporary condition. With the development of the mining industry in the northern portion of the Cordilleran belt it seems certain that the surplus products of this field will command a better price in the Rocky Mountain district, where the soil is not likely to afford food for the population which the subterranean wealth will attract to the country.

The whole of this region is beyond the limits of the great Appalachian forest, and no part of it is sufficiently moist to maintain the characteristic trees of that section with their normal growth. In the region of the Cordilleras there are certain species of pines and other arboreal plants which attain a tolerable growth with even less rainfall than comes to the district of the Dakotas. It is doubtful, however, whether they are adapted to the soil of this field. In South Dakota it is probable that many selected species chosen from other parts of the country can be successfully cultivated, and will attain a fair size, affording construction timber for simple purposes. In North Dakota success in forest culture can probably be attained in a more satisfactory measure by planting species chosen from the more northern part of the continent, as from the timbered district between Lake Winnipeg and Hudson Bay, or from Siberia, where, in an even more strenuous climate than that which prevails in any part of the United States, there are a number of kinds which attain a considerable development.

The greatest difficulty encountered in timber culture in this district, as in many other countries of wide-stretching plains, arises from the violence of the wind, which in the winter season appears to dry out the sap so completely as to kill the trees and from the lack of vegetable mold to form a soil coating of the spongy nature which is necessary for the growth of most trees. It therefore requires much care to secure the beginnings of a wood; but after a small area has been brought into the forested

state it is easy to extend the area by gradual accretions, the new plantings being sheltered and fostered by the protection which the established trees afford.

The mineral resources of this district are probably limited to deposits of coal of inferior quality, which were formed at a much later date than the beds of Carboniferous age. Although these coals are usually unfit for metallurgical purposes, and are not very good for use under steam boilers, they are likely to have great value as sources of domestic supply. In most other parts of the country the frontiersmen may rely upon the forest to afford a sufficient amount of fuel for their fireplaces; but here, where owing to the strenuous nature of the climate there is great need of firing material, the timber is limited to slight fringes of growth along the streams.

The underlying rocks of this district in many places afford a more than usually good supply of water, which may be obtained by boring. The rocks of a large part of this area were laid down in fresh-water lakes, and therefore do not contain the saline matter which often renders the subterranean water in other parts of this country unfit for domestic use or for irrigation. It seems likely that, owing to the level surface of the country and to the open texture of the soil, rather more than one half the rainfall enters the earth and maintains there a practically inexhaustible supply of water. By the use of windmills this may be lifted above the ground, and about each well the farmer may maintain a considerable area of irrigated ground devoted to the culture of those crops which require a greater humidity than the natural conditions afford. In the southwestern section of the district near the Black Hills it appears likely that exploration will develop other subterranean resources.

The occupation of this district by the whites has barely begun, and it is therefore impossible clearly to forecast the character of the people who are to possess this vast domain. Owing to the large volume of immigration from Europe which has taken place since the agriculture of the field began, the proportion of those of foreign birth who have settled in this region has been greater than that which originally came to the other parts of the great West. It seems likely that a larger share of the agricultural folk in the upper Missouri district is to be derived from the northern part of continental Europe than has gone upon the soil in the other portions of the Western plains. Up to the present time the settlers of other than English origin have not gathered in large commu-

Horseshoe Cañon.

nities, but have commingled with the native Americans in a manner which makes it seem likely that the population is to become thoroughly consolidated. There are few negroes in this district, and the physical conditions of the country are quite unsuited to their constitution.

Cordilleran Plateau District.

From the western margin of the main Mississippi and of its principal tributary, the Missouri, the surface of the country rises toward the foot of the Rocky Mountains. The general trend of this great stream is roughly parallel to the eastern face of that great range throughout the distance from the western borders of the Dakotas to the Gulf of Mexico. The upper Missouri from Northern Dakota to its source deserts this prevailing northeast and southwest course; the stream becomes divided into numerous tributaries, which flow from the valleys of the Cordilleran system. From the main channel of the great rivers to the foot of the Rocky Mountains the average width of the plateau is between five and six hundred miles. The westward rise of the surface is steadfast, and the summit of the inclined plane underlaid by the undisturbed rock is from three to five thousand feet above the sea. The eastern portion of this plain is included in the several agricultural districts which we have already considered. The western part of the field, in the main from the hundredth meridian westward, on account of its height above the sea and its remoteness from the influence of the Atlantic and the Gulf of Mexico, is prevailingly so arid that it is unfit for plow tillage. The measure of this aridity, as before noted in the account of the Dakota district, varies greatly. Along the alluvial margins of some of the greater rivers, it is possible to maintain tillage without irrigation to points somewhat west of the main line which separates the arid from the moderately humid region.

The common characteristic of this field—that which justifies us in regarding it as a unit in the geography of the country—is its unfitness for ordinary agriculture. This peculiarity is one which will profoundly affect the future development of our race in this field. Owing to it, the United States is divided as regards its economic interests into two fields of the East and West by a neutral ground of an essentially irreclaimable nature—a field wherein none of those agricultural arts which have led to our civilization can be extensively practiced.

Although the surface of this arid plain-land is here and there

diversified by large outlying hills, and even by considerable mountain ranges, such as the Black Hills of Dakota and the less important elevations of western Texas, the area is in the main plain like. The streams have rarely cut deep cañons, the country on either side of their channels generally slopes in a gradual manner toward the water courses. On account of the scant rainfall, all the streams of considerable size derive a large part of their volume from the Rocky Mountains, where they are fed by the melting snows. Because of their lack of tributaries, these streams vary little in the amount of water they convey from the point where they enter the plain until they discharge into the Missouri or other tributaries of the Mississippi. In the broad belts of country between these east and west flowing rivers it is often possible to ride for a hundred miles or more without encountering a single permanent water course.

As this plateau district has a north and south extension of about two thousand miles, the variation in its climate is naturally great. Owing, however, to the fact that the rainfall varies little in its amount, the difference, as far as all human interests are concerned, between the northernmost and southernmost portion of this realm is of relatively small importance. On the north this arid plain in the valley of the Saskatchewan gradually passes into the better-watered country of Canada, where a low forest growth prevails, and where the climate is of a subarctic character. The winter cold is enduring, being from time to time, however, moderated by the westerly or Chinook winds, which are somewhat warmed in their descent from the heights of the Rocky Mountains.

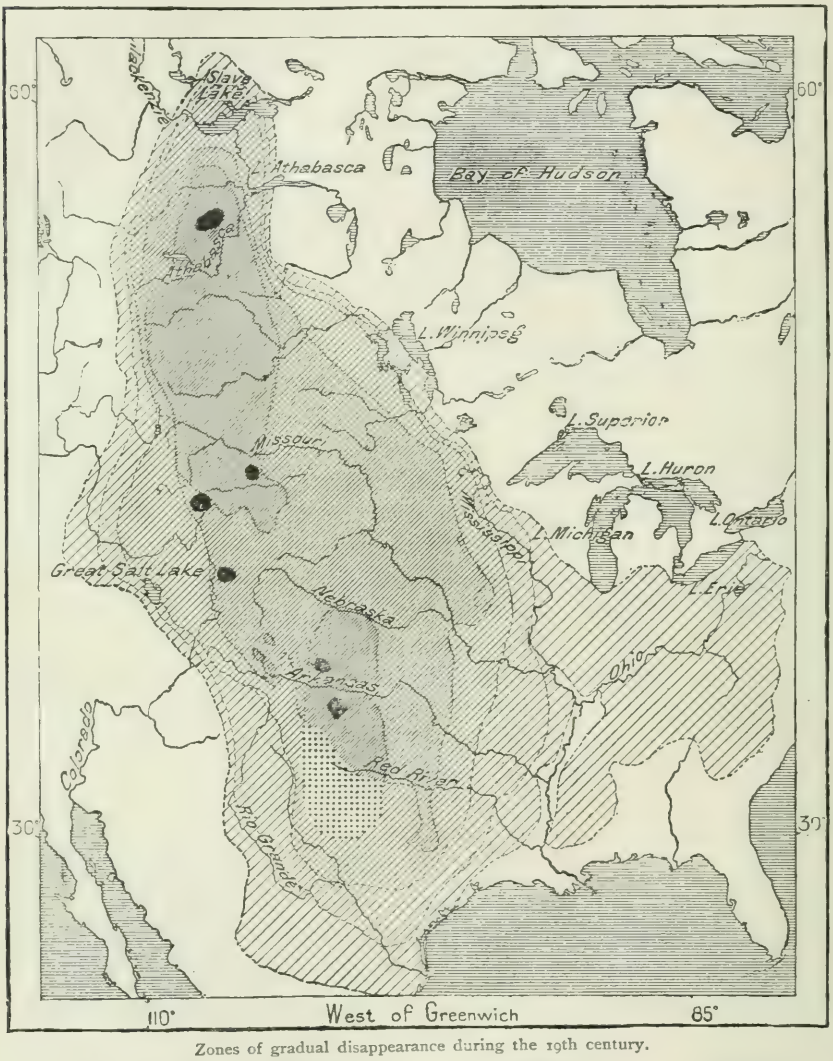
As the soil which underlies this area contains a large amount of mineral matter which is suited to the needs of vegetation, it is tolerably well adapted to the growth of all those forms of plants which rapidly mature their herbage, ripen their seeds, and are thus prepared to endure the seasons of prolonged drought which separate the rainy seasons of the year. There are, however, two natural difficulties which at present limit the development of these swift-growing plants which are suitable for forage or pasturage. The number of the species of vegetables which are indigenous in this region, and which have any value for the purposes of feeding flocks and herds, is small. Moreover, a large portion of the soil is in such a condition that an alkaline crust forms upon its surface which is very destructive to vegetation. Owing to these two conditions the value of the territory for pasturage is so limited

that the herds have to wander far in order to obtain the needed food. On the average it requires probably nearly fifty acres of area for the sustenance of each head of horned cattle.

Notwithstanding the above-noted disadvantages, this plain-land country in its natural state maintained vast herds of bison, and is at present very extensively used as a seat of cattle-rearing. In no other portion of the world, save in the valley of the Rio de la Plata in South America, are there anything like as many cattle reared upon the natural pasturage. It seems, however, likely that the food-giving power of these plains can in many ways be much increased. It should be an easy matter greatly to extend the variety of plants suitable to forage uses which grow within this area. Although the continent of North America is moderately rich in grasses, it has relatively few species of this group, or of the other forms of vegetation, which will grow on arid land and afford sustenance for flocks and herds. Experience has shown that such plants are readily to be introduced from other lands. There are probably at least a score of species which grow upon the arid grounds of Asia, Africa, Australia, and South America which would flourish on the Cordilleran table-lands if pains were taken to acclimatize them on its soil. It is probable that these foreign forms would not displace the native species; they would find their stations among the scattered indigenous growth, and thus increase the available herbage of each acre. Already the foreign weeds which have no value as forage plants are finding their way into the eastern margin of this arid district. It seems important to secure the introduction of useful vegetable immigrants before these foreign pests have any further hold upon the soil.

So far as is known, the mineral resources of the Cordilleran plateau appear to be more limited in their variety and their value than those of any other equal area on the continent. The great portion of the district is underlaid by rocks formed during the Cretaceous and Tertiary ages, strata which are characteristically lacking in substances that have an economic value. In the southern portion of the area, in western Texas and in the northern district about the Black Hills and near the gateways through which the streams pass from the Rocky Mountains to the plains, lower-lying rocks are frequently exposed, and these deposits are likely to yield some mineral stores. Magnetic iron and copper have both been found in the portion of the area which lies within the limits of Texas; and poor coals, generally of a lignitic char-

acter, appear to abound in the northern part of the field. Although these fossil fuels are rather impure, they are likely to have a considerable value as sources of local supply.



Gradual disappearance of the Bison.

The natural conditions of this district, though they exclude it from a place in the general agriculture of the country, clearly indicate for it a future in the pastoral art which is likely to give it very great place in the economic history not only of this continent but of the whole world. The rude method of herding which is now followed will doubtless give place to a more systematic method of rearing cattle and sheep. The pasturage will be improved by the introduction of foreign plants; portions of the area will be irrigated from the surface or the underground waters. Large parts of the area may, indeed, be subject to the plow, and made to bring harvests of certain swift-growing plants, which may be used in their green or dried state for forage. It seems not unlikely that by such improvements the food-producing power of this field may be made many times as great as it is at present. Thus, while for all time this region is sure to be scantily occupied by men, for the reason that its industries will not demand the presence of any considerable population, it is clearly not to be a wasted part of the continent, but is to have a certain share in its economic and its social life. It is manifestly to afford a peculiar kind of man whose educative contact with the earth is to depend upon the care of beasts alone. We already see something of the social effect in the peculiar character of the herdsmen of this area, men who lead a nomad life, and who acquire the peculiarities of mind and body which that primitive occupation entails.

The Winnipeg District.

The great central trough of the continent is prolonged to the northward beyond the valley of the Mississippi in a series of river basins, which are distinctly defined on their western border by the Rocky Mountains, but imperfectly separated on the east from the northern waters of the Atlantic Ocean by the low divides formed by the ancient, worn-down mountains which stretch from the region about the head of Lake Superior northwestwardly toward the Arctic Sea. There are three of these valleys—that of the Mackenzie, on the north; that of the Churchill; and that of the Nelson, which drains Lake Winnipeg. The first two or most northern of these basins lie so far toward the pole as to make their lands practically unfit for any form of agriculture. When the continent becomes crowded it is possible that a portion of their area watered by the streams which drain from the Rocky Mountains may be found suited for the tillage of certain quick-growing

grains. In the present condition of our society the Winnipeg basin alone can be regarded as of value to our people.

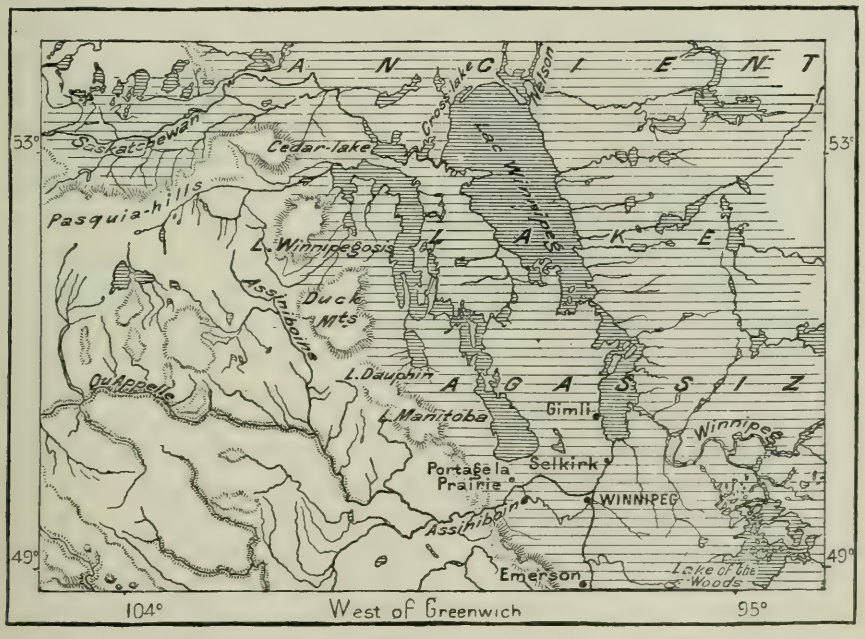
Lake Winnipeg is one of the four great fresh-water seas of the Canadian Dominion which in their extent as well as in the circumstances of their origin fall into the group of great American lakes. This basin has about the size of Erie or Ontario, but its trend is more distinctly northwesterly than that of any of the basins in the valley of the St. Lawrence. It receives two great tributaries—the Saskatchewan, which drains from the snow-clad mountains of the Cordilleras, and the Red River of the North, which is supplied from the wide field of drift-covered country in northern Minnesota and North Dakota. Both these streams are considerable rivers, maintaining a more constant flow than is common in those which are found in the more southern parts of the continent. Their relatively steadfast volumes are mainly due to the fact that to a great extent they are fed by the waters which filter slowly from the coating of glacial *débris*. A great portion of this area, including the whole of the valley of the Red River and a large part of the district about Lake Winnipeg, was at the close of the Glacial period covered by a wide expanse of water. The formation of this lake, known to geologists as Lake Agassiz, which at one time in area exceeded the present surface of Lake Superior, was most probably due to the fact that the retreating ice-sheet for some time maintained its wall near the northern end of Lake Winnipeg, and thus formed a dam, inclosing waters which discharged over the *col* at the head of the Red River into the drainage of the upper Mississippi. From the waters of this basin a large amount of fine sediment was deposited over the area occupied by the lake, which has helped to increase the fertility of the soil in the district now occupied by the valley of the Red River, and in much of the country to the east and west of Lake Winnipeg.

The valley of the Saskatchewan, though on the whole less fertile than that of the Red River, contains a large area of admirable soils. So far as this element in the resources of the country is concerned, it is fit to compare with any equally extensive field in the great continental valley. If the climate were as favorable to the needs of agriculture, this portion of the continent would be one of the most fertile of its areas. As it is, the district suffers from two considerable climatal evils: the rainfall, though greater than in the Cordilleran plateau, is, except in the valley of the Red River, generally insufficient for the needs of most crops; the summer season is dry, especially in its latter part,

In the Alkaline Valley, Black Hills.

and thus only the quick-growing grains can be relied upon for harvests.

The whole of this district is affected by a severe and prolonged winter, the rigor of which is slightly moderated by the relatively warm western winds which descend from the heights of the Cordilleras. Springtime comes late in the months which receive that name, the season of growth not really beginning until about the middle of May. The autumn frosts frequently begin in the latter part of August, so that the growing season may be estimated as having a length of not more than a hundred days. Nearly the whole of this district is too far north for the successful growth of Indian corn, which has hitherto been an almost necessary basis for successful agriculture in this country.



Scale 1 : 8,000,000. 185 miles.

Lake Agassiz. The shading indicates the original extension of the lake.

The agriculture of this district is still in the experimental state, and is suffering the inconveniences which have always attended the effort of colonists to understand the natural resources of the soil. It appears likely, however, that the exportable crops will be limited to wheat and the other small grains which mature with sufficient speed to be profitably tilled during the short sum-

mer. Owing to the fact that for more than six months of the year ordinary domestic animals have to be provided with food other than that which they can obtain from the ranges, it does not seem likely that the rearing of cattle will ever prove in any considerable measure profitable within this field. As long as the more southern portions of the Cordilleran table-land are not completely occupied by this industry, it is not likely that it will find much place in the Winnipeg district.

It is yet too soon to determine the value of the mineral resources in this district. Except on its western border, at the foot of the Rocky Mountains, the surface is prevailingly level and deeply covered with glacial waste, so that the character of the under geology, even of those portions which have been thoroughly explored, is as yet most imperfectly known. There is reason to believe that the impure coals or lignites of Cretaceous and Tertiary age may plentifully exist in this area. There is also reason to suspect that petroleum and natural gas may exist in certain of the lower rocks of this district. The general character of the rocks forbids the expectation of much subterranean wealth.

Although this northern outpost of our people occupies a field which is subject to some grave disadvantages of climate, there appears good reason to hope that when the inhabitants become reconciled to the peculiar environment it will prove a successful part of the continent in all that relates to human use. The climate, though severe, is not too rigorous for the best development of the race which was cradled in northern Europe; even though it should be found that the fields in time yield less rich crops of grain than at present, the soils and seasons will afford an abundant support for an agricultural population. We may confidently look forward to the development in this district of a hardy northern folk, who, though they may lack many sources of wealth afforded by more fortunate fields, will yet be able to win an abundant subsistence from the land. Except for certain mineral resources, the region is about as well conditioned for the use of man as the Scandinavian Peninsula, the cradle-land of our race.

Cordilleran District.

The Cordilleran district is on many accounts the most interesting portion of North America. It may be regarded as including all that part of the continent between the eastern face of the Rocky Mountain range and the western slope of the great chain of the Sierra Nevada and its northward continuation through the

central parts of Oregon and Washington, and thence through British America to high latitudes. The eminent characteristics of this field consist in its mountainous nature and in the general aridity or lack of moisture of the area. The arid character of this mountainous district begins in central Mexico, at about the Tropic of Cancer, and continues to near the northern border of the United States. North of the Canada line the annual rainfall is somewhat increased, and by the shorter summer the evaporation is diminished, so that the northern half of the district is not sterilized by drought, though it is made practically uninhabitable by the low temperature to which it is subjected. To give a full account of this district it would be necessary to divide it into at least half a dozen distinct areas, making each the subject of a separate description. To do this would undesirably extend this part of the work we have in hand. A great portion of the area is uninhabited; the larger part of it, indeed, is unfit for agriculture. It therefore seems best to include the whole territory in a single statement.

The Cordilleran system between central Mexico and the Canada line, takes on a character unknown in any other part of the great range. In South America, from Terra del Fuego to the Isthmus of Darien and thence northward to beyond the city of Mexico, the mountains of this system form a relatively narrow belt, the average width of the elevations being only about two hundred and fifty miles, and its extreme east and west extent at no point much exceeding about five hundred miles. From about the northern tropic the ranges of the system widen, so that between its eastern and western borders it includes a broad field of ridges and table-land which in the parallel of forty degrees has an east and west extent of about a thousand miles. Thence northwardly the field becomes narrower, and in the Canadian Dominion it is again reduced to about five hundred miles in width. The effect of this amplification of the Cordilleran mountains in North America is to convert a large part of its area into a mountainous country, and thereby much to reduce the portion of its surface which is fit for agriculture. About one third of the continent which lies to the south of the region which is sterilized by cold, is on account of these elevations cut off from the share of moisture which might otherwise render it fruitful.

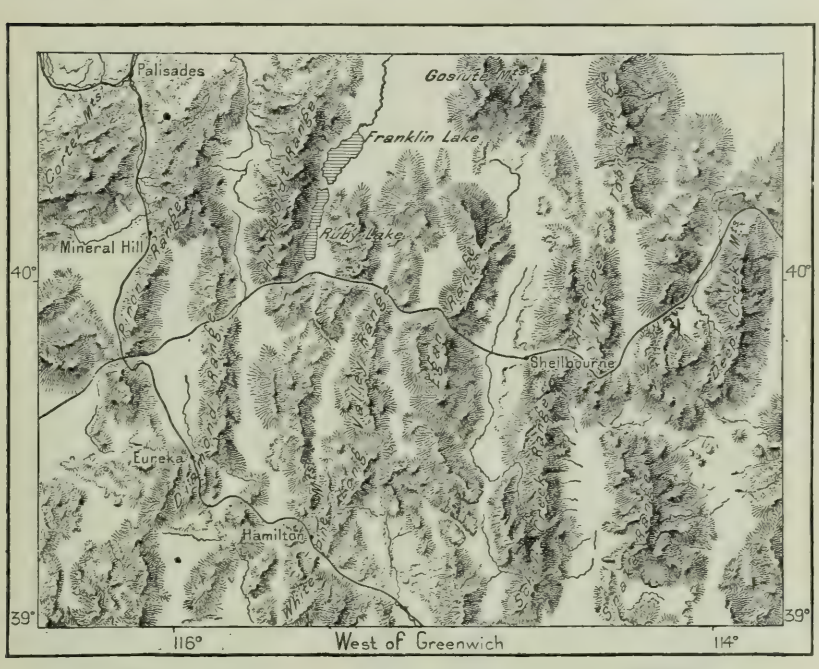
The effect of the Cordilleran elevations, in the portion of North America where the system is expanded in an east and west direction in the manner above described, is brought about

in two ways—by the irregular character which is given to the surface, and by the effect of the elevations upon the climate of the district in which they lie. The impression which is given by the maps of this country commonly leads to the idea that the whole of the district is occupied by mountain ridges. The fact is, however, that the field is best described by a table-land much intersected by sharp elevations. The greater lines of uplift extend in a prevailing north and south direction, usually deflecting somewhat to the westward. Between these dominant axes there are numerous lesser chains which are often parallel to the equator. The result is that the field is divided into a number of tolerably distinct basins, which generally lie at a considerable height above the sea and are fenced about by mountains. The height of these inclosed areas varies from levels which immediately north of Colorado are slightly below the plane of the sea, to the *parks* of Colorado, where the table-lands lifted with the uprising peaks are nearly two miles above the ocean level. Owing to the fact that the great wall of the Rocky Mountains is more continuous and generally higher than the ridges on the west, the drainage of the Cordilleran district mainly discharges through streams which fall into the Pacific Ocean.

In a very recent time in the geological past all the numerous basins of this area discharged their waters into the Pacific Ocean. Owing, however, to the great increase of dryness which has come upon this region in the present period, a number of the southern basins have an insufficient rainfall to compensate for the evaporation, and thus have become the seat of salt lakes. The most important of these dead seas lie in Utah and Nevada; they are, however, though of smaller size, continued southwardly into Mexico to the northern tropic. All these salt lakes, except those of the smaller size, are fed by streams which originate in mountains where the rainfall is locally more abundant than in the plains. They all exhibit indications of having recently shrunk from conditions of much greater extension, the process of their diminution being indicated by old shore lines above the present level of their waters. It is clear that in the yesterday of our planet's history they were much more extensive than they are at present.

Probably not more than one fifth of the Cordilleran area is so mountainous and rocky as to be unfit for tillage. The greater portion of the surface is covered by a thick layer of detrital rock material which only lacks sufficient moisture to become a very

fertile soil. As far as the character of the surface is concerned, the region is much more fit for agriculture than the Alps or the Pyrenees. Unfortunately for the needs of man, the climatal conditions of this area render a large part of its surface hopelessly



Parallel ranges of the Utah district.

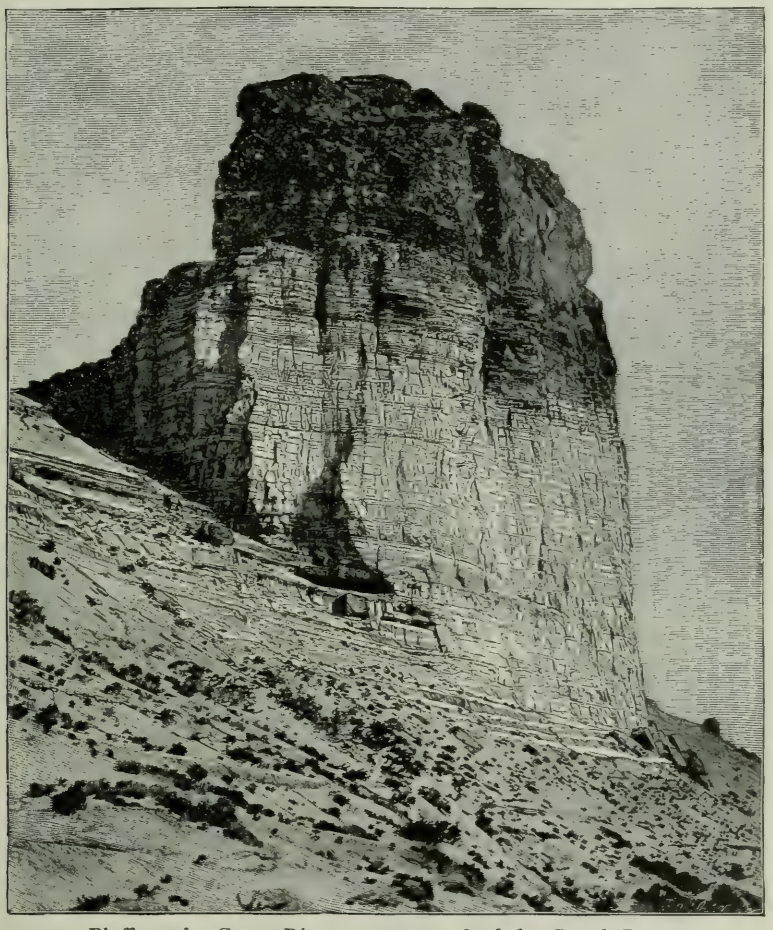
sterile. Except in the northern portion of the field, in the districts which border upon the Canada line, the rainfall is everywhere insufficient to maintain in the growing season enough moisture for the needs of the crops. Although the annual precipitation is subject to great variations in different parts of the field and in successive seasons, there is probably no portion of the area having an extent of ten thousand square miles where as much as twenty inches of water is on the average given to the earth. In the more arid sections from northern Utah southward the average rainfall probably does not exceed about twelve inches, and in certain limited districts it does not amount to one half this quantity. In the higher mountains, where the snows are preserved in the gorges and forests, a considerable amount of water is yielded to the rivers, and it maintains in them a relatively scanty flow throughout the dry summer and autumn. In this arid season,

however, the streams receive no contributions of any importance from the plain-land district; it often, indeed, happens that a free-flowing river gradually dries away as it passes into the plain-land of its basin, so that its volume gradually diminishes even before it attains the lowest ground in the area which it occupies.

Old Bonneville Lake, of which Great Salt Lake is a remnant.

The forests of this area are almost altogether composed of coniferous trees. They occupy the mountain ridges and the high-lying valleys amid the great chains, and only attain any consider-

able area in the Rocky Mountain belt from southern Colorado northward. In northwestern Wyoming and in the more moun-



Bluff on the Green River at upper end of the Grand Cañon.

tainous parts of Idaho and Montana, and thence northward in Canada near the fifty-fifth parallel, these Cordilleran forests are extensive, and frequently contain trees, mostly firs, of quite large size. The forests of the other portions of the field are mostly scanty woods, in which the individual trees attain no great dimensions, and afford little construction timber fitted for any but the simplest uses. Owing to the very dry nature of the climate, these forests are readily destroyed by fire. These conflagrations, which are destructive in almost all parts of the timbered lands of this continent, are peculiarly devastating in the Cordille-

ran district. A great portion of the woodland of this area which existed forty years ago has been swept away by the flames. These accidents are particularly unfortunate, for the reason that the timber of this country does not naturally restore itself. It is doubtful if any of the areas which have been burned over will ever again become woodland. The fact is, the remaining forests of the Cordilleras are the remnants of much more extensive woods which were developed in the time when the rainfall of this district was in quantity far greater than it is at the present time. The existing woods are only able to maintain themselves through the fact that the decaying vegetation which has accumulated within them retains the scanty rainfall, and so enables the trees to survive the protracted droughts. When the surface is bared by fire it is very difficult, if not impossible, for the plants to regain the field from which they have been dispossessed.

The physical conditions of this country have been peculiarly favorable for developing and disclosing a vast array of mineral resources. The formation of nearly all the important mineral deposits, except those contained in the list of materials which serve for fuel, appears to be favored by the processes which lead to the formation of mountain chains, particularly where the beds of disturbed rocks were laid down in the more ancient periods of the earth's history. The result is that, although the whole of the Cordilleran system from the southern part of South America to Alaska contains valuable mineral stores, the most important of these deposits lie within that part of the system which we are now considering.

The mineral resources of this field, although a large part of its area has not yet been submitted to careful study, are already known to be greater and more varied than those of any other equally extensive area which has been carefully examined. Certain parts of the Cordilleran system in South America are perhaps richer in the ores of silver and of copper; parts of Australia and of south Africa appear to contain greater stores of gold; but in no other realm has such a wide range of valuable mineral resources been discovered. The ores of gold and silver* are singularly abundant and widely distributed; the product of the first-named metal from the fields within this area has been greater than from any

* In 1887 more than half the total product of gold in the country came from the Rocky Mountain district. The value of the gold produced in 1887 in the United States was $33,-147,000. In the same year more than four fifths of the silver of the country came from this district. The total output of the country was valued at $53,433,320.

The Green River Cañon.

other mining district in the world. The product of silver has only been exceeded by that from the mines of Mexico and Peru. The ores producing lead are also singularly abundant, and, as they commonly exist in combination with silver, they are cheaply brought to the metallic form. At present this region produces more of this valuable metal than any other mining district.* Copper, principally in the form of pyrites or of copper carbonate, is extensively mined at several points in the area, the most extensive workings being in Idaho and Arizona.† Tin occurs in considerable quantity in that singular outlier of this mountain system, known as the Black Hills. Iron ores of high grade are known to occur in a widely distributed manner throughout this area, and though, in the present economic state of the country, they have no great value, they will doubtless in time have an important place in the catalogue of its mineral resources.

Fortunately for the future of the industries of this country, the subterranean stores of fuel are considerable in amount and occur at widely separated points in the field. In the main the coals are less good than in the Appalachian district, but there is a chance that with proper treatment cokes suited to all the various needs of the metallurgist may be produced in many parts of this Cordilleran field ; but, so far as yet discovered, only the beds in southern Colorado appear to be of the quality required for the purpose of coking. At several places in this field accumulations of natural gas have been found, some of which may prove of value in the arts. They probably lie altogether in the table-land areas of the greater valleys, where extensive districts of sedimentary rock, although lifted far above the sea level, have escaped the contortion which attends the formation of true mountains, and which generally leads to the discharge of the gases from the rocks through faults or the outcropping edges of the strata. Somewhat related to the fossil fuels are the deposits of carbonaceous matter, such as asphaltums and *earth waxes*. Both these groups of substances occur at various points in the Cordilleran district, but only the latter has as yet any economic

* Colorado in 1889 produced 70,788 short tons of lead, which was about one half the total output of the country.

† In 1889 Montana produced more copper than any other part of the country, not even excepting the Lake Superior district. The output was 98,222,444 pounds, nearly one half the total product of the country. Arizona ranked third, having produced 31,586,185 pounds during the year. From New Mexico there came 3,686,137 pounds, and from Colorado 1,170,053 pounds.

value. Several varieties of gaekerite, or earth wax, are mined and exported from this district. As this material is a new substance in the arts, it is worth while for us to note that it serves for the manufacture of varnishes and of oilcloths, in these uses taking the place of more costly vegetable gums which were formerly demanded in the manufacture of these materials.*

This district contains many other important earth resources besides those which have been already mentioned. In the regions about the salt lakes there are extensive deposits not only of common salt, but of various other substances which are left after the complete evaporation of river water which has coursed for great distances underground. It is likely that in the future these substances will prove an important part of the economic resources of the district. The mineral springs of this field are of very varied nature, and occur in nearly every part of the territory. Owing to the relatively slight rainfall, their waters are often very rich in dissolved materials, which is due to the fact that they are not so extensively diluted as is apt to be the case in regions where the precipitation is great.

Among the many inconveniences arising from the arid nature of this district we must reckon the difficulty which is encountered in securing a fit supply of water for domestic and manufacturing purposes. In the higher mountains perennial streams abound, but in the extensive plains, which are often so wide that the traveler may journey for great distances beyond the sight of the mountain crests, water fit for human use is often wanting. So complete is this destitution, that considerable areas which are supposed to contain the precious metals in valuable quantities have not even been prospected by miners. There is reason to hope that a careful geologic study of this district, such as the United States Geological Survey is now prosecuting, will prove it possible to obtain reasonably good water in nearly all parts of this field by means of boring. The tilted position of the rocks, and the frequent occurrence of porous strata, make it likely that this will prove in the future a most important means of rendering even the more desert places fit for the uses of the miner. It is evident that a considerable part of the rainfall enters the rocks, and there is reason to expect that this buried store generally remains in fit condition for human use.

* Fifty thousand pounds of ozokerite, a variety of gaekerite, were produced in Utah in 1889; in 1890 the product was increased to 350,000 pounds.

Within the Cordilleran district a large portion of the land near the banks of the principal streams is well suited to improvement

Scale 1 : 1,500,000. 30 miles.

Grand Cañon of the Colorado.

by irrigation. By storing the excess of water which passes into the rivers in the rainy season—a process which could be readily effected by constructing reservoirs in the mountain districts—enough could be retained within the field properly to irrigate areas aggregating many thousand square miles. In nearly all the valleys of this area the earth fitted for soil purposes is deep, and when sufficiently moistened produces crops of remarkable luxuriance. Here, as elsewhere in arid districts, the growth of vegetation where plants have sufficient water is remarkably favored by the continuous and brilliant sunshine. It seems likely that when the rainfall of this district is made to do its utmost service in the way of irrigation, the region will be able to supply the large part of the food products required by the vast mining population which in time is to find occupation within it.

In all that relates to the health of the people this district seems the most favored portion of the continent. The excellent bodily condition of those who have been born and nurtured in this part of the country shows clearly that the realm is admirably suited to the physical needs of our race. This fact is the more interesting and instructive for the reason that in the Cordilleran district the north European people have for the first time to occupy a region of prevailingly great elevation. Experience clearly shows that these novel conditions are in no wise unsuited to their habit of body. Except in the southern portion of this district, within Mexico and the neighboring parts of the United States, this region has been settled by an admirable class of immigrants, mostly of English blood. The Mexican district contains a mixed race, in part derived from Spain, but very largely intermingled with the aboriginal population.

It is evident that the Cordilleran district is to be the seat of a peculiar people, rendered exceptional by the character of their occupations. In the main, they are to be engaged in winning the subterranean resources of the field. They are to be miners and smelters of ore. Those engaged in tilling the soil are to be employed in a very high grade of agriculture, such as is required on irrigated land. Here and there in the desert there are to be oases of rare fertility, and from perhaps hundreds of mining stations there will be produced a very wide range of subterranean products. It seems likely that in twenty years from the present time the aggregate of commercial values which will thus be won from this "Great American Desert" will be as large as that obtained in any equal area of the continent.

California District.

In the Sierra Nevada and along the Pacific coast of North America we have two districts which deserve special mention. That of California is the southernmost of these fields. This area may be regarded as including the coast-land belt and the valleys of the Sacramento and San Joaquin Rivers, as well as the great promontory of southern California. This section includes a narrow area having a length of about fifteen hundred miles. The southern half of the extension includes the peninsula of Lower California, on many accounts the most singular of the half-islanded lands of North America. The southern section of this district, including about one half of the whole surface, may be briefly described.

Lower California is a promontory having an average width of about a hundred and fifty miles and a north and south extension of about seven hundred. It is in effect the southern prolongation of the Sierra Nevada mountain range, which here, though less elevated than within the limits of California, is a lofty and continuous set of ranges, bordered on either side by foot-hills and a narrow belt of plains. As this peninsula extends from about 26° north latitude southward to beyond the tropics, it lies within the more heated portion of the continent, and under ordinary conditions would be a region of rare fertility. Although it is bordered on the west by the Pacific Ocean, and on the east by the wide Gulf of California, it is the most arid district which exists on the shore-lands of the continent. The average rainfall probably does not exceed about ten inches. As the air is excessively dry, but little of this water courses to the streams, which are of trifling volume, and almost altogether dry in the summer season. Except here and there, where some small field may be irrigated, the whole region is absolutely unfit for agriculture.

Between the southern border of California and the line of the Santa Maria River, in the thirty-fifth parallel, the air is still so dry that the forests are extremely scanty, only a few districts of timbered land on the elevated ground deserving the name of woods. From the line of the Santa Maria River northward to near the borders of Oregon the California area is occupied by the rivers which discharge through the harbor of San Francisco and by the narrow strip of coast-land that lies at the foot of the mountains separating that wonderful vale from the sea. This basin of California is by far the richest portion of the Cordilleran system. It is favored alike in climate, soil, and under-earth resources.

The great north and south extension of this district induces a considerable variety in its climate. Southern California is a land of untempered heats, having the characteristics of the other tropical deserts of the world. From its northern border to the great California basin the climate is subtropical, and near the coast of a delightful character, the warmth of the summer being modified by the air from the sea; while the winter temperature is likewise made constant by the neighborhood of a great body of warm sea-water. A somewhat steadfast increase of the rainfall as we go northward causes the whole of the great valley of California, as well as much of the shore-land, to have an air of moderate humidity. The climate of this basin is remarkably uniform through-

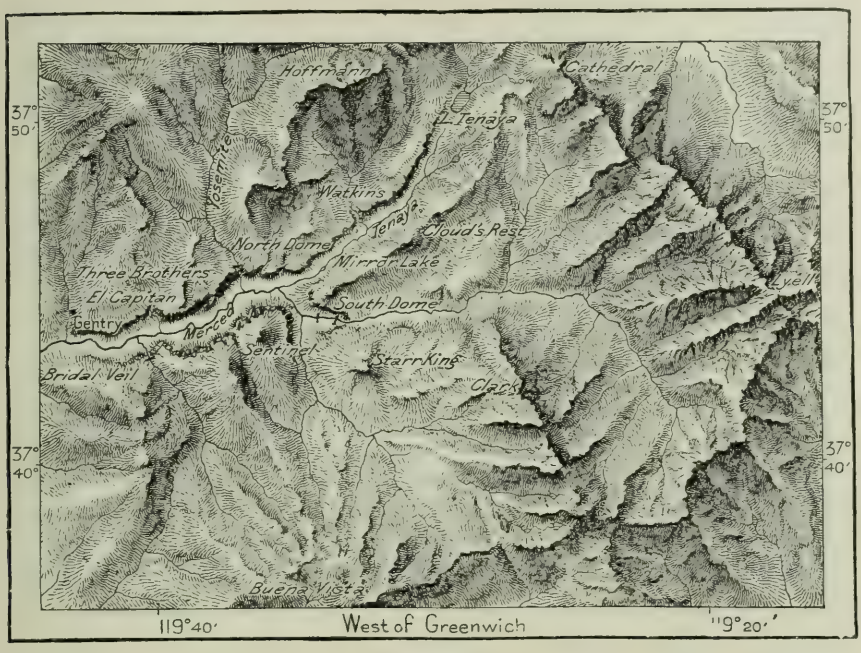
out the whole of its north and south extension. Probably no section of the continent having an equal length on the meridians varies as little in the measure of its temperature and its humidity. The only atmospheric ill from which this region suffers consists in the prevailing drought, which sets in in the later springtime, and commonly continues, with slight interruptions, for about six months. The summer temperature of the interior valley is high; the winter cold is, however, moderate, as is indicated by the fact that the orange and other subtropical fruits can be grown throughout the greater part of the district.

The shore-land belt has an equable climate, the thermometer in winter rarely falling below the freezing point, and in summer seldom attaining a temperature above 85°. The relatively cool waters of the Pacific Ocean, which along this part of the shore are affected by a current setting southwardly from the Alaskan district, greatly mitigate the summer heat and induce much fog. The rainfall of the area is very irregularly distributed. The most considerable precipitation is along the western face of the Coast Ranges and on the same slope of the Sierra Nevada Mountains. The whole of this area, however, is traversed by the rivers which drain from the upland country on the east and west, so that, even where the local precipitation is not sufficient for the needs of agriculture, the ground can often be watered by irrigation ditches for a considerable distance from the streams.

Those portions of the country in and about the great valleys which are not heavily timbered, and which are not irrigable, are tolerably well suited for use as cattle ranches and for the pasturage of sheep. These flocks and herds find the climate admirably suited to their needs. They are unusually exempt from diseases; and the natural forage, though it probably could be greatly increased in value by the introduction of foreign grasses and leguminous plants, is richer than in the other equally arid portions of the continent. The whole of this region is naturally adapted to the culture of small grains and of fruits. It is doubtful if any portion of this continent is so well suited for the rearing of these two varieties of agricultural products. There are wider areas of grain fields in the Mississippi Valley, but none where the annual yield is larger, or where the soil endures the tax of tillage so well as here. Throughout the great valley, and on the belt of coast lands south of San Francisco, all our ordinary fruits are easily reared and attain a great perfection. The grape and the varieties of citrous fruits are also very successful as far south as San

The Marble Cañon, Colorado River.

Diego, but irrigation is generally necessary in that country. As a whole, the region is too dry for most of the root crops.



Waterfalls.

Scale 1 : 400,000. 6 miles.

Yosemite Valley.

The forests of this district are practically limited to the region in and about the great valley. South of its area there are only a few patches which have a forestlike character, by far the greater portion of the area being either absolutely without trees, or covered with a stunted and scattered growth which is without commercial value. Along the coast belt north of San Francisco, and on the western slopes of the Sierra Nevada, the forests are denser than in any other part of the United States, except in the yet nobler woods of eastern Oregon and Washington. Over an aggregate area of more than fifteen thousand square miles it is estimated that the timber amounts to more than two hundred cords to the acre.

As a compensation for the scanty development of the hardwood timbers, the conifers of this district attain majestic size, and afford admirable timber for ordinary construction purposes. The

most important of these are the sugar-pine, the yellow pine, the red fir, and the redwood. The latter is the most important economic tree in California, or perhaps in this country. Single trees occasionally yield as much as seventy-five thousand feet of lumber, and two million square feet have been taken from a single acre. The greatest of our American trees, perhaps the largest arboreal form in the world, is the *Sequoia gigantea*. This species, belonging to a group which at one time occurred over a considerable part of the continent, is now limited to certain small fields in the southern portion of the Sierra forest. The total area occupied by these woods is only a few square miles, and there is much danger that the species may, in the centuries to come, cease to be represented. The tallest of these trees approach four hundred feet in altitude. In height they are probably exceeded by some of the greater eucalpytus trees of Australia, but in girth of trunk as well as in dignity of form they are doubtless unsurpassed by any other plant.

All the forests of California are subject to serious ravages by fire. In the year 1880, Professor Sargent estimates that over three hundred and fifty thousand acres of these woodlands were thus ruined. At this rate of destruction it will require only about thirty years to destroy these noble woods, and reduce the regions they now occupy to an arid state. Owing to the fact that these forests of California are inheritances from the time when the rainfall seems to have been more considerable than at present, it is doubtful if the process of natural growth will ever return the surface to the wooded state in the measure in which the repair is effected in the moister parts of the continent. There is probably no portion of this country which is blessed with noble forests that would be likely so severely to suffer from their loss, or where such exceeding care is necessary for their preservation. The effect upon the flow of waters in the rivers which would arise from their destruction would doubtless be very great. Many streams which now have a tolerably steadfast flow, would, if their head-water districts were deforested, become raging torrents in the rainy season and dry during the arid portion of the year.

The population of the California district is of an exceedingly varied nature. The few people who dwell in Lower California are of the Mexican mixed race. The southern portion of the State of that name contains a considerable remnant of Mexicans who settled in the country before it became a part of the United

States. Most of the people are, however, of English derivation, and have in the main been longer upon the soil than those occupying any other part of our Cordilleran area. There are already many thousands who are of the third generation since the settlement of their ancestors on the land, and their physical condition shows that the climatic and other features of the area are admirably suited to the requirements of our race. Owing to the great distance of this territory from the principal seats of the English-speaking people, the process of its occupation has been slow. It has in its soil and mineral resources the basis for the maintenance of a population several times as great as now dwells within its bounds. The present quality of the people is well indicated by the condition of the higher education in the district. As measured by the age of the State, by its population or wealth, California has a nobler system of higher instruction than any other part of this country. In no other State has the teaching in the upper grades advanced so rapidly as in this.

The mineral resources of this district are great and singularly varied. The fossil fuels consist of coals contained in rocks of secondary age. These are tolerably well suited to domestic use and for steaming. They are, however, unfit for metallurgical purposes. There are also some limited deposits of petroleum which have yielded oil for local use. The iron ores of this field are scanty, and none are known which are likely to have any commercial value. Among the rarer metals gold holds the first place,* the district of California proper, in and adjacent to the great valley, having afforded more of this metal than any other equally extensive area in the world.

From the time when this region was annexed to the United States gold has been the most important element in its commercial history. Although the value of the product has decreased in late years, it still remains considerable in amount. The reduction has been due altogether to the legislative enactments which forbid the washing of the gravels about the head-waters of the streams by the hydraulic process, it having been found that the *débris* from such work injured the farming lands along the greater rivers. Considerable deposits of the ores of mercury exist in the Coast Range, and there are several mines which have produced this metal. Owing, however, to the high cost of labor as com-

* In 1887 California produced $13,400,000 of gold, of the total $33,147,000, produced in the country.

pared with European countries where there are mines of quicksilver ores, the production has of late years diminished in quantity.* Numerous other metals of the rarer sort occur in various parts of this area, but none of them have been made the objects of the miner's art. There are some deposits of silver associated with lead, but they appear to have much less value than those which are found in the neighboring district of Nevada. Important as the mining industries of this district have been and are at present, it is evident that it is as an agricultural rather than as a mineral field that it is to have value for the future. It is better adapted to the culture of fruits which have a high commercial value than any other equally extensive area within the United States. It is doubtful, indeed, if any portion of the tropical district of America can vie with it in these products. It is particularly well suited for rearing grapes for the purpose of making wine, the orange, and the peach—all fruits which afford a very large return for the care bestowed upon them. The grape in particular exhibits a vigor and producing capacity unequaled in any other portion of the continent; and the wines from this district, although still somewhat inferior to those of the Old World because of the lack of traditional skill in their treatment, already have a high place in this country, and are valued in the European markets.

Until the completion of the Pacific Railway, in 1867, the development of California, by its singularly isolated position, was greatly retarded. It contained the only considerable body of the English race domiciled on the borders of the Pacific Ocean. Its commercial relations with the eastern part of the continent were conducted with great difficulty by way of Cape Horn or the Isthmus of Darien. In fact, until railway communication was secured, California was not an integral part of the American Union, but a far outlying colony, as remote from the heart of the national life as any of the great possessions of the British Empire are from England at the present day. Although the rapid advance of railway construction during the last twenty years has greatly bettered its situation, the improvement in the conditions have not been sufficient to give to the region anything like the measure of advantages due to its commanding position. In the port of San Francisco it has one of the best harbors of North America—the

* In 1880 there were 59,926 flasks of mercury, of 2,000 pounds each, produced from this district, but in 1889 the production had fallen to 26,464 flasks.

Plowing and thrashing, Manitoba.

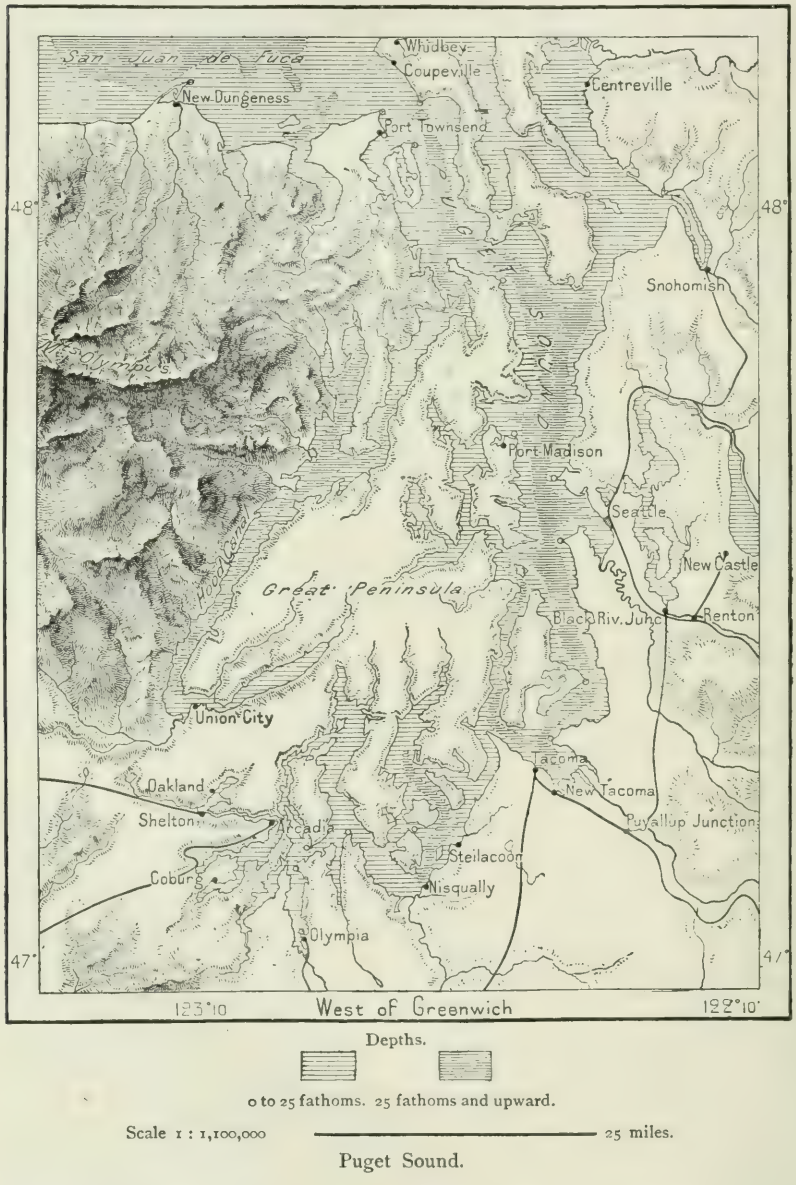
only thoroughly satisfactory port on the western border of the continent south of Puget Sound. Along with the region of the Columbia River on the north, California is evidently destined to be the seat whence the English of North America will obtain commercial control of the lands about the Pacific Ocean. It is through the extension of the commercial relations in this vast realm that this part of our land will find its place in the affairs of the world.

Columbia District.

North of California, including the seaboard portion of Oregon and Washington and a part of the Canadian Dominion which lies to the south of Alaska, lies a part of the continent which deserves especial mention, and which we may name, from its greater river, the Columbia district. This belt of country has an average width of about two hundred and a length of about a thousand miles. On the east it is bordered by the considerable mountain ranges which continue the Cascade Range to the northward. Further inland from this range we enter upon the arid portion of the Cordillera field. South of Puget Sound the Pacific coast-line of this territory is but little diversified by indentations. North of that inlet the shore has the fiord type, being bordered by islands and deeply parted by many-branched re-entrants. A large part of the surface of this area, perhaps more than one half of its superficies, has a mountainous character, but the elevations are much less than in the California district, and the slopes usually more gentle. Probably two thirds of the region is suitable for some form of cultivation.

The most important climatal peculiarity of this region is found in its relatively great rainfall. In no portion of the area is the winter climate severe, the temperature of zero being rare even in the northern portion of the field. The summer heats, though occasionally great in the southern area, are not continuous. The climate as a whole more closely resembles that of Great Britain than any other portion of the American continent. From this point of view the region is, indeed, the true New England of America. The range of seasonal variation in temperature is not more than that of the British Isles. The greater islands which border the coast—Vancouver and Queen Charlotte—are the largest insulated lands along the Pacific coast of the Americas. In general the climatal conditions are dominated by the neighboring sea, it being little affected by the winds from the circumpolar regions, or from the dry country on the east.

The soil covering of this district is commonly deep, and of a very fertile nature. To a certain extent it rests upon volcanic



Puget Sound.

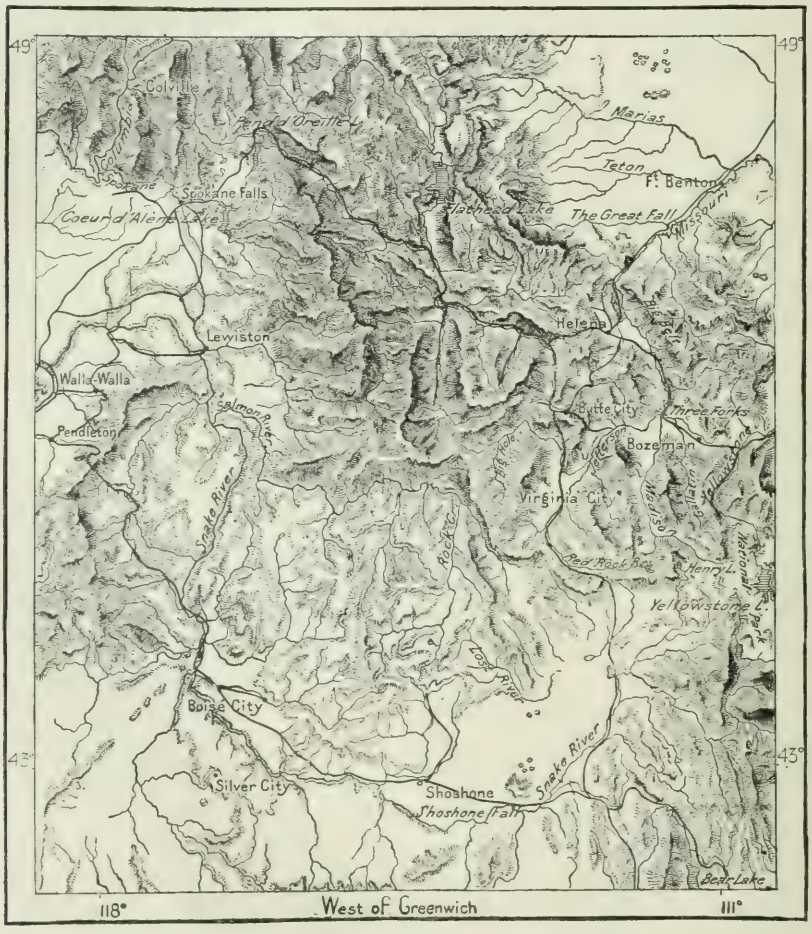
rock, which here, as elsewhere in regions of considerable rainfall, afford excellent soils. Although there has doubtless been some glacial action in the higher parts of the country, there is hardly

anything which can be classed with the drift of the Ice period, the detrital matter having been usually derived from the rocks which immediately underlie the particular field. The alluvial deposits of the valleys are extensive, and afford soils of exceeding fertility.

The forest covering of this part of the country, though not the most unbroken, is the heaviest of any in the United States, and it is doubtful if, on the whole, it is surpassed by any other equal area in the world. These admirably timbered fields may be regarded as the northward continuation of the great woods of California. In Oregon they occupy two broad belts, each from fifty to sixty miles wide, lying to the east and west of the fertile Willamette, Umpqua, and Rogue River Valleys, the disposition of the woods being much the same as that which exists about the great valley of California. In Washington the forests are more massive, but they are partly divided into east and west areas, being but slightly connected by a great isthmus of woodland in the central portion of the State. The most valuable woods of this great system of forest belong, as in California, to the cone-bearing genera. The most valuable species are the red fir and the red cedar, but a number of other forms akin to the hemlock and the spruce are important elements in the forest. A considerable portion of these forests in Washington afford more than two hundred cords of wood per acre, and by far the greater part of their area is so dense that more than fifty cords can be obtained. It is stated by Sargent that a yield of two hundred thousand square feet of lumber to the acre is not uncommon, and that over an area of twenty thousand square miles in Washington alone a yield of two hundred and fifty thousand feet per acre may be reckoned on. North of Washington the valuable portion of the timber belt is considerably narrowed, and with the further northing the dimensions of the timber trees steadily decrease. Valuable forests, however, forming a strip along the shore, extend into the southern portion of the Alaskan area.

As far north as the parallel of fifty degrees, or as far as the mouth of the Fraser River, the climate of this district permits the rearing of all the ordinary crops to which our race is accustomed. The fruits of the district, however, do not include the grape, for, though that plant will develop in the area, the climate is too humid for its best crop. Like California, the region is particularly well suited to the small grains. Owing to the depth and fertility of the coating, as well as to the infrequency of torrential

rain, the wasting of the soil goes on much less rapidly than in the eastern parts of the continent. So far as experience has gone, the earth promises to be unusually enduring to the tax of tillage. The considerable annual precipitation leads to the development of many large rivers. The Columbia is the greatest stream south of the Yukon, and is, indeed, the only considerable river on the Pacific coast of the Americas which is destined to have any importance to man. Many of the streams are of such permanent



Scale 1 : 7,000,000. 124 miles.

Missouri-Columbia divide.

flow that they are suited for water powers, and will doubtless have much importance for manufacturing purposes.

Within the fiord district, from northern Washington to the extremity of the tillable field, excellent harbors abound, which are well placed with reference to the interior country. The waters of Puget Sound, in Washington and in British Columbia, next after San Francisco, afford the best portals of the Western coast. They have the peculiar advantage that they are nearer the grain-producing States of the Mississippi Valley than any other region of harbors on the main shore of the Pacific Ocean. The port at the mouth of the Columbia is suited to the use of large vessels, though it is somewhat difficult of entrance. It can, with proper improvements, however, be made one of the most important marine gates of North America. As a whole, the harborage facilities of this part of the coast of the continent are better than those which exist along any other portion of its shore where the resources of soil and of underlying rocks are great. In few lands is the combination of the natural resources and ports so perfect as here.

The mineral deposits of this district are much less well known than those in the other portions of the mountain-built region of the North American Cordilleras. The reason for this is simple. While in the central portion of these mountains, and even in much of California, the surface is generally timberless, and the rocks to a great extent exposed to view, the Columbian area is usually occupied by dense forests, which entirely conceal the surface of the ground, and thus leave the disclosure of mineral deposits to chance excavations. So far the only mineral resources of much value which have been exploited in this field consist of coal and gold. The coal-beds which have been worked lie in the region about Puget Sound on Queen Charlotte Island and the neighboring portions of the mainland. So far as is yet ascertained, these coals are the best found on the Pacific coast of the Americas. They are of fair quality for domestic use and for the production of steam. It is not yet certain that they are fitted for the production of coke of a quality suited for use in smelting iron. The gold field of the district occupies a considerable portion of its area. So far, however, the principal workings have been limited to the placer deposits. Considerable deposits of vein gold are known to occur in the southern part of the territory, and with the advance in the knowledge of the geology of the country, which will be slowly gained, we may expect that very numerous other lodes will be found. Deposits of nickel are known in the southern portion of the area, and it seems probable that the mines

of this metal may prove hereafter to be next in importance to those which produce coal.

The water supply of this district which may be used for domestic or manufacturing purposes is better than on any other inhabitable part of the Pacific coast of the Americas. Almost everywhere there are large and permanent streams heading in the forested mountains, the waters of which may be led to cities. The deep layer of detrital material which covers the country maintains the volume of these streams, and affords good mill water in the greater portion of its area. The ground water is generally exempt from that excess of soluble mineral matter which degrades its quality throughout the greater portion of the Cordilleran Mountains.

The experience of the people in this district since the settlement of the country appears to indicate that all the circumstances of their environment are admirably suited to their physical needs. The difficulties arising from the malarial poisons which produce ordinary ague have been experienced in the lower valleys along the coast, but no other portion of the continent having an equally humid and warm climate has been so little affected by this class of diseases. An analysis of the vital statistics appears to show that the region is more wholesome than any other equally extensive area on the continent. It is doubtful, indeed, if there is any other part of this continent of similar extent so well suited to develop and maintain the vitality of man.

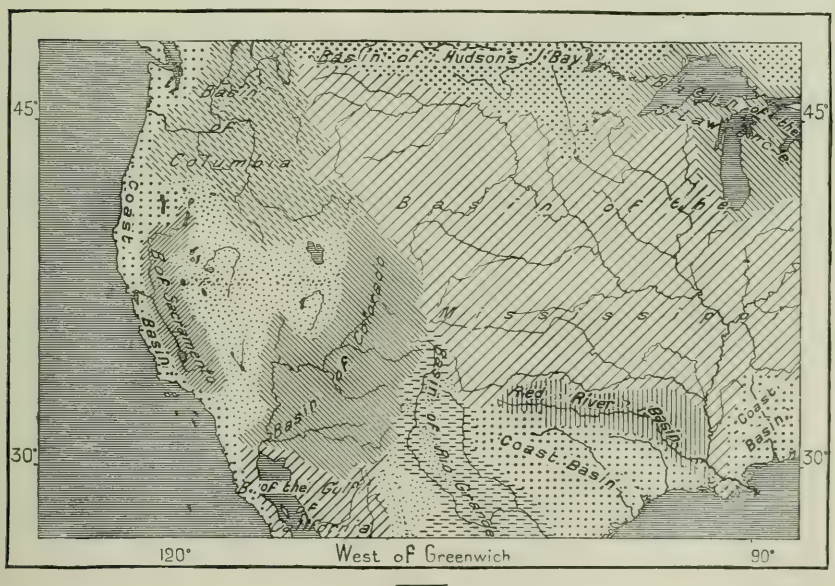
The whole of this region has been exceedingly fortunate in the character of the white population which has come to occupy it. These people have been, in the main, drawn from the English-speaking people of the northern part of the United States, and of Canada. Probably no other equally extensive portion of the continent now contains as unmixed a body of people who derived their blood from the British Isles. The isolated character of the settlement has clearly served to maintain the vigor of its colonies. The journey from the eastern portion of the United States or from Canada is long and costly. Only people of decided enterprise, and of some means, are likely to undertake it. As regards the population, the only serious difficulty arises from the numerous Indian reservations which beset its surface. A considerable portion of Washington is occupied by these stumbling-blocks to the progress of our race, and some of them are found in the fertile portion of Oregon as well. Fortunately, however,

The Rocky Mountain sheep.

these citadels of savagery, which have been unwisely planted in this land, are held by small bodies of Indians.

The marine fisheries of this district are already among the more important of the continent. The fiord part of the coast-land is an admirable nursery for the salmon, species of this group attaining a numerical development in this region which is unexampled in any other part of the shore line of the continent. Although the other indigenous fishes have not a like great value, it seems probable that the efforts of the United States Fish Commission will, by plantations of species from the Eastern shore, succeed in making this region one of the best fishing-grounds in the world, both as regards the number of kinds and their numerical abundance. The aborigines of this field were to a great extent fishermen, and it seems likely that their successors, the whites, are likewise to be much engaged in the same employment.

Owing to the admirable harborage of the Columbia region, it is likely to be the principal seat of commerce between the conti-



River basins of the West.

nent of North America and the other countries which border on the northern part of the Pacific Ocean. There are already indi-

cations that much of the trade of Europe with the eastern coast of Asia is to traverse North America on the northern system of transcontinental railways which terminate in the harbors along this part of the shore of the great ocean.

The student of North America who seeks to foretell the course of events in the coming century finds great assurance as to the prosperity of this part of the continent. As regards the natural resources of the soil and the rocks, the quality of its climate and the character of its population, it seems likely to attain a swift and eminent development. Taken together with the California district, the possession of this field by our race goes far to insure the dominance of our people in the wide realm of the lands in and about the Pacific Ocean. With the Australian English colonies in the southern hemisphere, and this American group of settlements in the northern region, we may feel sure that our race is eventually to control that great system of seas. Of all the seacoast of the Pacific except China this Anglicized part of the western coast of North America is the best suited for manufacturing industries. The abundant water power, and the considerable amount of coal, as well as the character of the climate of that field, admirably fit it to be the seat of great mechanical industries, and it is through this group of arts that commercial power alone can be obtained. Notwithstanding their great resources, the Australian colonies are not nearly as well placed for the development of the technic arts as is this portion of the American coast.

Alaska District.

North of the Columbia district, from the parallel of fifty-five degrees north latitute to beyond the arctic circle, lies the vast domain which the United States purchased from Russia. At the time when this territory came into the possession of our people an exaggerated value was put upon its natural resources. Further inquiry has shown that, on the whole, the country is essentially unfitted for any extensive occupation by civilized people. The narrow fringe of mainland and islands which lies to the south of the parallel of sixty degrees north latitude is sufficiently far south for the brief summer to admit the tillage of certain hardy crops, such as the small grains. The climate is equable, exceedingly moist, and the cold waters of the neighboring sea cause the country to be fog-wrapped for much of the year. The main district of Alaska, from Mount St. Elias northward, is totally unfit for any form of tillage. The winter is long and the cold en-

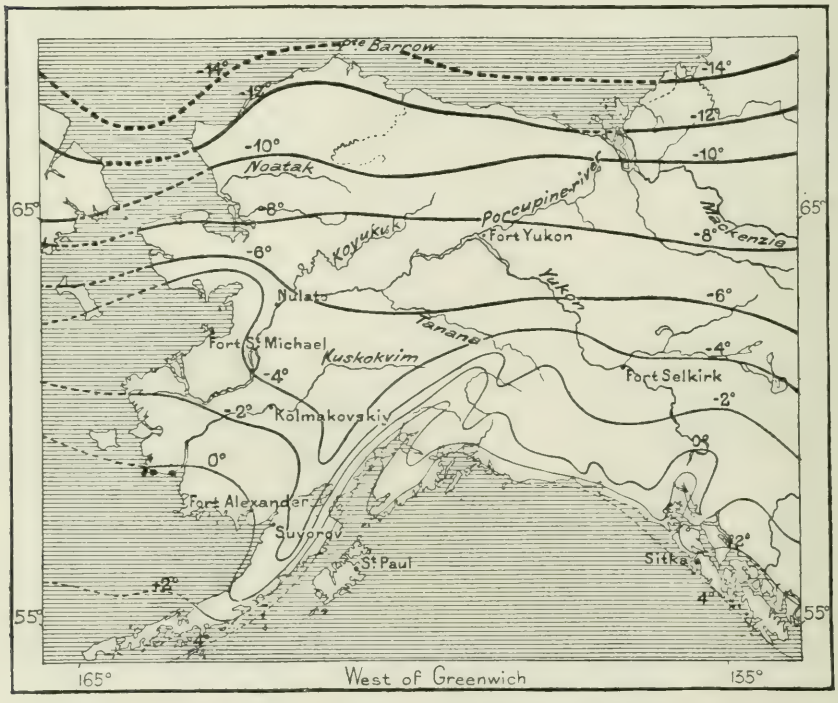
during, while the summer season is brief and cool. As far north as Mount St. Elias the shore is extremely beautiful, being, in fact, the most picturesque portion of the continent. The elevations attain a greater altitude than any other mountains which are so near the open ocean. Mount St. Elias is probably the highest peak of the continent. The beauty of the scenery of this region is greatly increased by the fact that this portion of the Cordilleran system is extensively occupied by glaciers; a number of the ice streams force their way down the valleys to the border of the sea. North of Mount St. Elias the Alaskan area contains no great mountain chains. Its most remarkable geographic feature

Zones of trees and range of chief animal species in Alaska.

consists in the wonderful archipelago of volcanic isles which extends eastwardly toward the Asiatic shore.

Although the greater part of this area is sterilized by cold, it

affords quite a wide range of natural products which are of commercial importance. The southernmost portion of the district, from Simpson River to Sitka Island, is covered by the northernmost part of the great woodland which is so richly developed in the Columbia district. Although this forest is relatively stunted, it contains much timber of value, and it is likely to be much drawn upon for the supply of the mining establishments which are developing along the southern shore of Alaska. On any other part of the coast-line of this continent these woods of southern Alaska would have a very great commercial value, but in competition with the marvelous timber resources of the Columbian and California regions they would have but little importance. The whole of this coast affords excellent fishing-grounds, and in its northern part lie the breeding-places of the most valuable of all the fur-bearing animals, the seals of the north Pacific. The mainlands also yield valuable peltries, though the region is less well suited to the fur-bearing animals than the interior portion of the continent.

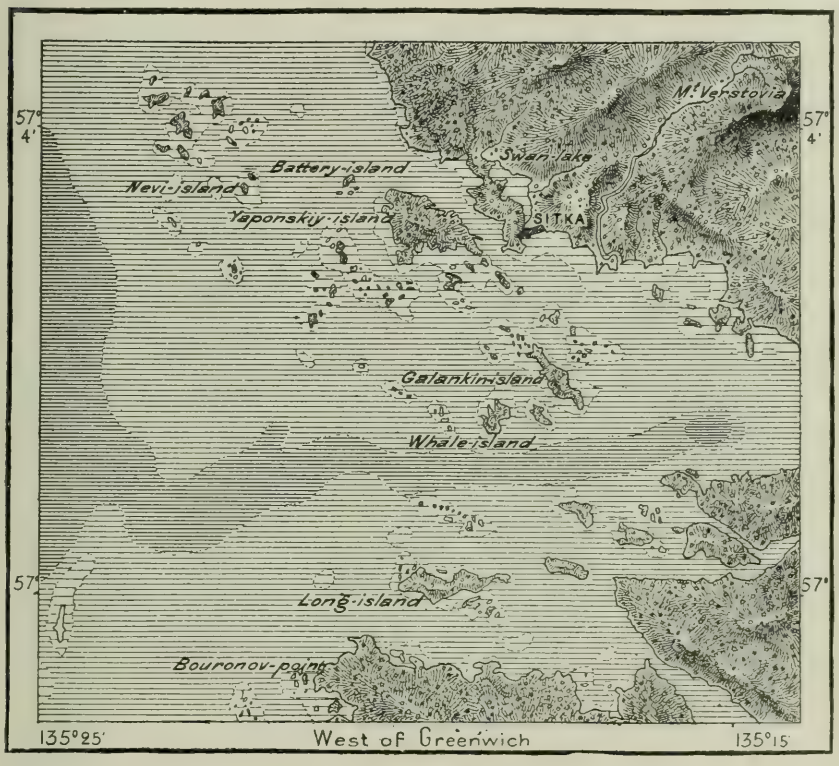


Scale 1 : 20,000,000. 40 miles.

Isothermal lines of Alaska.

Sitka, Alaska.

The most important subterranean resource of Alaska is probably to be found in the gold-bearing ores of the seashore belt, and yet the exploration of the field has been confined to a small part of the area; but in proportion to the search the disclosures of value have been surprisingly great.* There is reason to anticipate that in the immediate future this section may become the most productive seat of gold-mining within the limits



Sitka Bay.

of North America. As a whole, it is well placed for such industries. The water supply is abundant, and timber suitable for fuel or for construction purposes can readily be obtained in the forests

* Although as late as 1880 the gold mines yielded no returns, the eleventh census shows that in 1889 the output of gold from Alaska amounted to $700,000 per year.

of the southern portion of the area. The geological structure of the country, so far as known, makes it seem unlikely that valuable coals will be found within this field. If beds of this nature are discovered, they will probably belong to the Cretaceous age, and have the same elements of inferiority which characterize the other deposits on the Pacific coast of this continent.

Although the Alaskan district is never likely to prove the seat of any important agriculture, it seems probable that its mines and fisheries will give employment to a considerable population. It will become a nursery of seamen, and it may afford much mineral wealth. The Territory as a whole must be regarded as a mere adjunct to the other portions of the Pacific coast. It can never secure a large place in the social or commercial life of that region.

The Caribbean District.

In the southern portion of North America, within the tropics, and therefore under climatal conditions which are unfavorable to the descendants of north European peoples, lies a great area of mainland and island which is at present so intimately related to our own portion of North America, and is in the future to be so closely bound up with the economic history of the more northern part of the land, that it should receive some mention in this sketch of the regional divisions of the continent. This area includes the long strip of relatively narrow land from the city of Mexico southward to the Isthmus of Darien, and the remarkable archipelago of the West Indies, extending from near the northern point of Yucatan to the mouth of the Orinoco River in South America. The continental portion of these lands is formed by parallel ridges of the Cordilleran system, and by certain curious diversions in the way of ridges, which depart widely from the prevailing trend of that system in the promontories of Honduras and Yucatan. The archipelago of the West Indies appears to be composed of the crests or higher portions of a long mountain range, the larger part of the mass of which is below the level of the sea, and of volcanoes and coral islands which are associated with the submerged ridges. The lands of this district, together with the peninsula of Florida, inclose two important seas—the Gulf of Mexico and the Caribbean Sea—the two forming what is essentially one system of waters, which communicates with the Atlantic through the Strait of Florida and by the numerous passages between the several islands which border the basin on the east. As these intimately united bodies of water deserve a com-

mon name, it may not be amiss to term it the Columbian Sea, commemorating thereby the name of the explorer who first penetrated to this part of the New World.

The whole of this region except the upland parts of the higher mountains has a truly tropical climate, and is thereby unfitted for the best uses of our race. The English settlements on Barbadoes, Jamaica, and some of the other small islands which have been colonized by the British, have, as in the case of the other tropical colonies founded by that people, shown that the conditions of continuous high temperature are, on the whole, unfavorable to the constitution of this race which was cradled in the high north. The experience of the settlers from other portions of northern Europe is to the same effect. The history of all these colonies points to the conclusion that the north Europeans do not belong in this part of the world. The only profit which they can obtain from it will be won through commerce, and not by occupation of the country with their own folk. The natural resources of this region, both those of the soil and of the subterranean realm, are great and varied. The earth produces the whole range of tropical products; every portion of the surface, except that of some small islands in the western Caribbean, has a sufficient rainfall for tillage; in general the soil is fertile, and almost every part of the area is advantageously placed for the shipment of its products. Taking into account the relations of these lands with the remainder of North America and with Europe, we may fairly deem this the most fortunately placed of all the tropical realms. It has been in every way favored by Nature; its only misfortunes have come through the character of its population.

The whole of the Caribbean region, with the exception of a few of the islands which have been more or less continuously controlled by the northern states of Europe, represents in its conditions the traditions of the Spanish people. The object of these invaders, unlike those who settled the English portions of North America, was to obtain profitable dominion rather than to found states in the likeness of the mother country. Unlike the English settlers, they have mingled their blood with that of the aboriginal race. This intermixture was most completely effected in the continental portions of the area. In proportion to the European people, the number of Africans imported into this district was larger than in any part of North America. Although a considerable part of the cultivated people of European descent remain

pure-blooded, the body of the population which occupies this field is of mixed race.

The negro population is proportionally largest in the greater islands of the West Indies. In Hayti and Jamaica they have almost complete control of the land; and in Cuba, those who have negro blood in their veins probably constitute a majority of the population. In the first named of these islands the government of the country has been for many years in the hands of the negroes, and the result of their dominance has been altogether evil. This beautiful island, which by the French and Spaniards had been brought to a relatively high state of cultivation, has to a great extent relapsed to its primitive condition. On the mainland the intermixture of negro blood is less considerable, but that of Indian origin is greater than in the archipelago. Although the aboriginal folk of Central America, Yucatan, and southern Mexico were decidedly further advanced on the path of civilization than the Indians in the northern part of the continent, they had not won their way above the level of barbarism, and were on the whole a folk unsusceptible of much culture. A portion of these people remain in their aboriginal state, but their blood is extensively commingled with that of the Spaniards. The result of this intermixture has been the development of a people of rather limited capacity. Experience seems to show that democratic institutions, such as are the foundation of the English states, can not be maintained among them. The nearest approach to a republican form of government which has been achieved consists in the military oligarchies which have been established in the mainland portion of this district. Although this system may give many of the advantages which a government can afford, it differs widely from that which is demanded by a people of English origin.

Besides the resources of the soil which may be won by agriculture, and which include all the important tropical products except spices, the forests of this region afford a great range of valuable timbers which are suited to the finest construction work. Mahogany, which has been for nearly two centuries the most valuable wood in general use for furniture, abounds in this part of the world, and there are a number of other species which yield excellent timber.

The mineral resources of this district are considerable in variety and value. The island of Cuba contains very extensive deposits of high-grade iron ores, which are likely to prove a most

A family of antelopes.

important resource for our American furnaces which are situated near the seaboard. Large quantities of the material are now shipped to the United States. Extensive deposits of bitumen or asphaltum exist in Trinidad * and in Cuba; gold is found at a number of points in the Central American district; and several of the islands in the Caribbean Sea have afforded large amounts of guano and other fertilizing materials which have been accumulated on their surfaces by the marine birds. In the Mexican portion of the area the ores of silver abound, and have been worked for nearly four centuries. The precious metals are practically limited to the mainland portion of this district, though gold occurs in Hayti, and perhaps on some other of the West India islands. The Spaniards were such assiduous searchers for the precious metals that they probably found all the localities containing the ores which produce these metals in this realm. The known deposits of gold do not seem likely to yield a large amount of the metal; and the silver mines have been worked to a great depth, and are now diminishing in their production.

The condition of the population and the prevailing social institutions of this part of the world make it evidently undesirable that they should ever become a constituent part of our country. Its share in the life of the northern part of the continent should be limited to commercial relations. The mutual profit attainable by the two sections through their exchange of products would naturally be very great. The tilled crops and mineral products of each complement the other in a very advantageous manner.

* In 1890, 54,692 long tons of asphaltum were imported from Trinidad to the United States, and 1,857,000 square yards of Trinidad paving was laid during the year.

CHAPTER IV.

THE NORTH AMERICAN INDIANS.

Origin of the Indians.

Ever since the discovery of America and the first acquaintance by Europeans with the peoples inhabiting its continents, the problem of the origin of those peoples has been discussed, but without solution. It was long regarded as a postulate that in some manner they immigrated from the Eastern hemisphere, but the various explanations of the supposed migrations have been as numerous as they have proved to be unsatisfactory and mutually destructive.

Theories that the American Indians came from Norway or from Lapland have been as violently pressed and opposed as those contending that they came from Ireland or from Iceland. Equally forcible and equally weak are the arguments for a passage from Asia across Bering Strait, whether before or after the supposed land connection, across the northern Pacific Ocean in junks from Japan or China, or across the southern Pacific in catamarans from Australia or the Polynesian Islands. The system of currents in the Atlantic would accelerate the voyages of colonists from its eastern shores; and when that ocean has seemed too broad for this prehistoric navigation, a suppositive island called Atlantis has been provided as a midway station for rest on the crossing. Thus the imagined ancestors of North American Indians have been found among the Jews, Phœnicians, Scandinavians, Irish, Welsh, Carthaginians, Egyptians, Tartars, Hindus, Malays, Polynesians, Chinese, and Japanese—indeed, among almost all divisions of mankind. Once the "lost ten tribes" of Israel were favorites in the genealogic tournament, but lately the tendency among ethnographers who busy themselves on this problem is to accept an ancient Turanian immigration.

The archæologic evidence that man has existed in America for a very long period is conclusive; and it is now believed, contrary to the views at one time upheld by a school of writers, that

anciently he was in a ruder state than in modern times, or, in other words, that he has been advancing, not retrograding. Linguistic testimony is to the same effect, and there is a strong probability that man lived upon the Western continents long before he acquired articulate speech. There is, indeed, no valid scientific argument to be made against the converse of the common belief that America was peopled by pre-Columbian migrations from the Eastern hemisphere.

In the controversies upon the origin of the American Indians some traits or characteristics of tribes have been noticed which undoubtedly correspond with those known to prevail, or to have once existed, among the populations of other parts of the world, and great stress has been laid upon the coincidences of this character. A more profound study, however, shows that these resemblances are such as are exhibited between all bodies of men who in any region are in a corresponding stage of culture, and that such differences as appear between such bodies are modifications produced by environment. The fact has not generally been given due weight that the Indian tribes, though as a rule in the same stage of culture, differed greatly in the advances severally made by them in that stage. It is at this time more useful to study their known conditions, sometimes similar and sometimes diverse, in sociology, languages, arts, mythologies, religions, and customs, than to speculate upon their unknown origin, which is a geologic problem for whose solution sufficient data have not yet been accumulated. By this mode of study, which is indicated in the present paper, they may be more readily and intelligently connected with the rest of the human race.

Indian Sociology.

Society was organized among the American Indians on the tribal plan as distinguished from the national plan. In the tribal plan bodies politic are composed of groups of kindred, in which the kinship is mainly real, but to some extent artificial. This organization is independent of territorial limits. On the other or national plan the organization is on a territorial basis. In North America no nations, properly so defined, were discovered. In most of the tribes of the continent the fundamental unit of organization was the clan. The clan group is distinguished from the gens group by the rule that, in the former, kinship is reckoned in the female line only. Husband and wife must always be of different clans; intermarriage within the clan is forbidden. The

children of the pair belong to the clan of the mother. The eldest male member of the clan was usually its head or chief, though in some cases the clan chieftaincy was elective. All the children of the clan were under the authority of the chief of the clan and not of their fathers, because their fathers belonged to other clans. Fathers, therefore, were not responsible for their own children, and had no legal authority over them, but exercised authority over the children of their sisters and of their female relatives. A few of the tribes, however, at the time when their system first became understood by students, were organized on the gentile plan, in which kinship is reckoned in the male line. It is probable that this deviation from the general rule was comparatively recent at the time it was noticed, and had arisen under exceptional conditions. Each tribe was composed of a number of clans or gentes, varying from five to thirty; a tribe, therefore, was a congeries of clans; these are related to one another through the marriage ties and the consanguinity of their individual members, for all the fathers of all the children of the clan belong to clans other than those of their children, and all the mothers of all the children belong to clans other than those of their husbands. A tribe, therefore, is a group of people bound together by definite bonds of consanguinity and affinity. Sometimes captives in war and other persons were adopted into the clan. The right of adoption inhered in women; and when a prisoner of war was adopted he was recognized as the child of the woman who adopted him, and his rank in the tribe was the same as would have been that of a child born of the woman at the time of the adoption. All the children of the woman born prior to his adoption were recognized as elder brothers or sisters of the adopted person, and children born after his adoption as his younger brothers or sisters. This is one example of the manner in which artificial kinship was established.

Sometimes several tribes were organized into a confederacy, and in some cases there was intermarriage between the tribes of the confederacy, but such proceedings were rare. The mutual relation to one another of tribes constituting a confederacy was determined in its grand council, and was always the subject of much discussion in such assemblies. To a large extent, but perhaps not universally, a peculiar artificial kinship was thus established, as the members of the several tribes recognized one another as brothers and sisters. In such cases it became necessary to establish rank, and elder and younger tribes were established in the

brotherhood of the confederacy, so that the people of one tribe should be recognized as the first born, another as the second, and still another as the third. A general provision that they should recognize one another as brothers and sisters was insufficient to establish legal relations, without also determining distinct relative rank and authority. Sometimes the tribes constituting a confederacy had other tribal relations than those of brotherhood. One tribe might be recognized as the grandfather of the confederacy, another as the father, and still another as the son; and the grandfathers, fathers, and sons might severally have brother tribes; so that a group of tribes constituted a complex system of artificial kinship.

This artificial kinship, resulting in relative rank, arose naturally. The most fundamental law of authority in tribal society rests upon superior age. The elder brother has authority over the younger, the uncle over the nephew, the elder sister over the younger sister, and the aunt over the niece. To determine authority or rank it was therefore necessary in all cases to establish relative age. In order to make the enforcement of this law simple and sure, a system of kinship terms was used in which relative age was always expressed, so that, if two members of the tribe met, the kinship terms by which they addressed each other expressed relative age. Hence there was never a single term signifying brother, but one signifying elder brother and another signifying younger brother. There was no term signifying uncle, but a term signifying uncle older than myself, and another signifying uncle younger than myself. In like manner, all the kinship terms in tribal society express relative age. Everywhere a stringent law ruled intercourse, by which people of the same tribe or confederacy were forbidden from addressing one another by any other term than the proper kinship term, so that it was impossible for any one member of the clan, tribe, or confederacy to speak to any other such member without addressing him by a term which would claim or yield authority. Names which had been conferred from merit or demerit, from accident, or as *sobriquets*, abounded in tribal society, but they were always used in the third person, and generally to describe some one absent. It was an insult and a crime to address a person by his given name. In general these given names were classified, and the system of names was used by each clan as its exclusive property. When a person was addressed, the relation between the speaker and the hearer was always shown by the address itself; and when

a person was spoken of, the clan to which he belonged was expressed.

These laws of marriage, naming, and authority were fundamental in tribal society, but they were modified in a variety of artificial ways, though always under strict rules. In some tribes there was a system of promotion in the clan, so that a person advanced to the chieftaincy by grades in the civil or religious organization was by such promotion elevated a number of grades in kinship, whereby a person actually older than himself would be compelled to address him as senior and thereby to yield authority to him. This was an inherent necessity, because, as before explained, the kinship terms by which people are addressed, the only ones that can be used, are of such a nature that authority is always claimed or yielded.

While the head of the clan was the oldest male member, he could be deposed for old age or other inefficiency, and the next of age, being his vicar, succeeded him in the chieftaincy. In some cases, however, the chief of the clan was elected, and in a few cases he was appointed by the tribal council. In every tribe there was a great variety of ranks and offices, and there often was a system of promotion from rank to rank, such promotion changing the relative age grade. The methods of promotion and election were various, and exhibit many curious legal customs, but the subject is too voluminous for further discussion at present. One illustration may be given. Among certain Creek tribes that are members of the Muskhogean family, the clans were divided into two phratries, called the red and the white people. All executive and military officers were selected from the red phratries, all councilors from the white phratries; the color white being made the emblem of wisdom, and the color red the emblem of prowess. Now, the people of the white phratry were promoted from grade to grade in the red phratry and chose all their officers, and the people of the red phratry were promoted and elected in the white phratry.

It has already been said that no person could marry in his or her own clan. In general, marriage was by appointment. Sometimes a man must marry in a particular clan—that is, every woman of one clan must become the wife of a man in some other particular clan. These husbands, then, being clansmen, all had wives that were clan-sisters; but the sisters of these clansmen were not given to the brothers of their wives, but to the clansmen of a third group. In some cases the man must not only marry a wife

from some other clan, but she must also be from some other phratry. Perhaps the most prevalent law was, that a man could marry a woman in any other clan than his own. But in all these cases the man and the woman themselves had no choice in the matter; the marriage was always arranged by the elders in clan or tribal council. Three modifications of this system of marriage are found. A man and a woman not belonging to the same clan, desiring to be married, might elope and escape into the forest; if they succeeded in living together unmolested for a prescribed time, they could return to the tribe and the marriage would be recognized as legal. Second, when an appointment had been made for the marriage of a man and a woman, some other man, not belonging to her clan, might wish to have the woman for his wife; with the consent of his own clansmen he might announce this fact, and the right to the woman would be settled by wager of battle. Third, if the women of the clan are many, and the particular clan into which they may marry have few men, other clansmen may seize one of these marriageable women and carry her away, to be the wife of one of their clansmen; this is marriage by capture. Marriage within the clan was everywhere prohibited; two such persons could not live together, and the attempt to consummate such marriage was punished with death. Thus it is seen that marriage was exogamous in the clan and endogamous in the tribe, exogamy and endogamy being correlative regulations in the same transaction. The attempt which has been sometimes made to classify the tribes as exogamous or endogamous has no basis in fact.

Totemism.—It was customary among these tribes for each clan to adopt a tutelar god. As will hereafter be more fully explained, all the tribes were polytheistic, and they had a great variety of deities, the most important of which were animal gods. Thus, in one clan the bear might be the tutelar god or totem, in another the wolf, in another the spider, in another the eagle, in another the heron, and so on. Sometimes there was a corn tutelar deity, a rain tutelar deity, or a sun tutelar deity. But as most tribes were mainly zoötheistic, animal gods were usually selected as tutelar deities or totems. The tutelar god always gave name to the clan. This is the simplest statement of totemism.

Patriarchy.—Among many tribes the elder man or oldest male member of a clan or gens was the chief or superior in rank and power. Thus the government within the clan or gens in this unit was so far a patriarchy; but actual superiority of age was

not the universal rule, as artificial age was often recognized. The elder man, therefore, or ruler of the group, was the grandfather of the clan, real or artificial. Among the North American Indians there is no such rule as a *matriarchy*—that is, there was no case where the elder woman was the chief of the clan or gens. In all the tribes kinship through males and kinship through females were clearly differentiated; but both systems of kinship were invariably recognized, though used for different purposes. The members of a clan were a body of kindred reckoned through females, but this organization did not establish a matriarchy in the sense that the woman was the ruler, or in the sense that the woman ever became chief. Women were never promoted in the political organization, but were often promoted in the religious organizations—that is, they sometimes became shamans, but never chiefs; and the fact that they exercised authority misled some of the early explorers in their reports. No instance is known of a tribal patriarchy. Patriarchies when found are usually clan organizations, where kinship is reckoned in the female line, but the chieftaincy belongs only to males.

The particular form of patriarchy so well recorded in the Old Testament—where the elder male was chief in a body of kindred reckoned through males, and where such chief had great, indeed unlimited, authority over his male descendants, their wives and families, and over their flocks and herds—is never found among the Indian tribes of America. It is a form of government impossible to the stage of culture in which they were discovered, for its development depends upon the domestication of animals and the possession of flocks and herds. Where clans were found, kinship through females was the clan bond, but the clans themselves were organized into tribes, and the bond of the tribe was kinship through males and kinship through marriage. Where the gentile organization was found, the bond of the gens was kinship through males, but the gentes themselves were organized into tribes by a bond of kinship through females and by marriage. The clan, or the gens, when the latter is found, is the group within which intermarriage is impossible. These are incest groups, though in a sense wholly diverse from the definition of incest in civilized life. In such incest groups degree of consanguinity was not considered. A man and a woman belonging to the same clan or the same gens could not marry each other, no matter how distant the degree of relationship, nor could they when the relationship was wholly artificial. The term patriarchy may

be wrested from its time-honored use and given to what is generally called the gentile group, but this only introduces confusion, for the composition of this group must be distinguished from its form of government. The form of government sometimes, but rarely, belongs to the gentile group. Much oftener the form of government belongs to the clan group, with kinship reckoned in the female line. The patriarchy, then, is a group in which the oldest male member is the ruler; the clan is a group in which kinship is reckoned in the female line; and the gens is a group in which kinship is reckoned in the male line. Whether or not these definitions are accepted, these words are used in the present paper in the sense specified; and whatever terms are used, the facts must be differentiated. Sometimes the clan is a patriarchy, but not always; sometimes the gens is a patriarchy, but not always. The tribe is never a patriarchy, and in the tribe all classes of kinship are recognized — through females, through males, and through marriage.

Mythology and Religion.

Mythology. — The often-asserted statement that the North American Indians believed in a single and supreme God is without foundation. They were all polytheists—that is, they believed in a great variety of mystic and wondrous beings, whom they worshiped in various ways, on whom they called for assistance in the exigencies and trials of life, and to whom they attributed all good and evil. The evil they endeavored to avert by various acts, ceremonies, and observances. They did not divide these marvelous personages or gods into two well-marked classes, as beneficent and maleficent, though a few were mainly good and others mainly bad. Nor was any clear division made between these superhuman personages and human beings, nor between human beings and the lower animals. They believed the world to be peopled by gods, men, and animals, and that all living beings were endowed with wonderful powers, and were in a general way upon the same grade. For example, the animals were supposed to have languages of their own, to be organized into clans and tribes, and to have chiefs and to hold councils. The gods also were thought to be organized in the same manner, and to have institutions and arts; and all gods, men, and lower animals were endowed with like purposes and passions. The mysterious powers of the gods were exhibited in many wonders of Nature, and the mysterious powers of men and the lower animals were

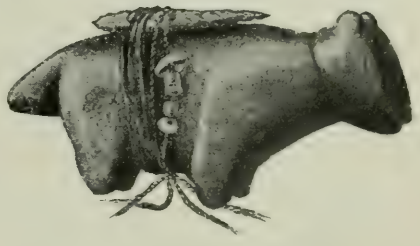
exhibited in the practice of sorcery; for they all believed that animals, as well as human beings, were sorcerers. The distinction between gods, men, and animals, here made as convenient for the treatment of the subject, was not clearly made by the Indians themselves. Men and beasts are only tribes of living beings, and the gods are also tribes of living beings, sometimes having human forms, but usually the forms of the lower animals. In general, though not always, the gods are mystic animals, and all these living beings—gods, men, and animals—are potent, mysterious, and wonderful by reason of their powers of sorcery and divination, as exhibited in multifarious ways. To a large extent the gods are unseen beings—that is, they can conceal themselves from human sight; but by the powers of sorcery they are revealed from time to time to a few persons, the shamans of great lore. The gods thus habitually conceal themselves, while men and animals have the power to render themselves invisible, and sometimes they do so; therefore there is no clear demarcation of them even in this respect. The gods live in the main a spiritual life as shades of unseen personages, but they can put on material bodies at will. Men and animals more habitually occupy material bodies, but they can leave these bodies and exist as shades, and at death the habit of living as material bodies is changed to the habit of living as shades.

There were still other personages in the hierarchy of gods which require mention—certain beings whose bodies are inanimate objects, as trees, mountains, and rivers; but these beings can also lead a double existence—that is, they may leave their material bodies and exist as shades. Sometimes a variation from this theory is found—namely, that these daimon-gods, as they may here be called, use the trees, rocks, mountains, and rivers only as habitations, and have themselves the forms of the lower animals, which they can assume, or can appear as shades at will. The general tendency was to give all the gods animal forms, and such beast-gods greatly outnumbered all others. Very many of the tribes, perhaps all, looked upon the moon, the stars, the rainbow, and other objects and phenomena of Nature as gods which usually occupy animal forms but have the power to present themselves in the above-mentioned forms of Nature. Many of the powers and phenomena observed in Nature were attributed to the powers exercised by the gods as sorcerers. Thus, the wind is usually the breath of beast-gods, sometimes the fanning from under the wings of bird-gods, while the rain and snow are poured

upon the earth by the power of gods living in the skies. All tribes seem to have believed in a number of worlds—worlds above and worlds below, and sometimes worlds to the east and worlds to the west, worlds to the north and worlds to the south. Those of the latter class were rare, so far as yet discovered; but the upper and lower worlds were general if not universal elements of the cosmos. With all tribes there was a tendency to consider certain of their gods as superior to the others. In a few tribes this tendency is well marked. As every clan had a tutelar god, its own was usually exalted above the rest, and thus became for the clan or gens its god of gods.

This description of the deities of the North American Indians applies in a general way to all the tribes, but in a few tribes some important modifications of this mythology of the deities are to be observed. Among the Natchez, the Iroquois, the Zuñi, and apparently among certain other tribes, especially in the Pueblo region and in Mexico, the animal gods and daimons of inanimate objects are still believed to exist in great numbers, but are of little importance. In their hierarchy of deities the great objects in the heavens, such as the sun, moon, and stars, and the great powers and phenomena of Nature, together with fire and a small number of beast-gods, constitute an exalted grade, and they are held to be the creators and rulers of the universe, always with the tendency to exalt some one of them to the chieftaincy, on the same system as among the living men. The sky, sun-god, or fire-god, is usually, though not always, taken as this chief.

The present writer has designated the lower stage of mythology, described as being general among the North American Indians, as *zoötheism*, because the great majority of the gods have zoic—i. e., animal—forms. In this stage the tutelar gods of the clans are usually zoic, and the gods themselves are often held to be progenitors or prototypes of the animals bearing the same name, and sometimes, though not always, to be the progenitors of the clan bearing the animal name; though it seems that many clans have been named so late in history that the theory of descent from the tutelar god has not become established. In zoötheism, then, most of the gods actually have the name be-



Bear fetich of the Zuñi.

longing to the lower animals; but a few, who live in the sky, or in trees, rocks, mountains, and rivers, have names not belonging to the lower animals. Usually they have animal forms, but all the gods, wherever they live or whatever be their habitual forms, have the power to assume other forms at will and to make themselves invisible, or to exist as shades or spirits.

Among some of the tribes mentioned above—viz., the Natchez, Iroquois, Zuñi, and others—the peculiar form of mythic theism is denominated *Nature worship*, or *physitheism*. In it, as before mentioned, a few gods, being the great objects of the heavens and the mysterious phenomena and powers of the world, are exalted above all the others, and become the principal objects of worship. Max Müller has clearly set forth this phase of mythology, in which certain tribes of North America are found. Thus, both zoötheism and physitheism are found among the Indians. Zoötheism prevails among tribes in low form, while among many tribes some elements of Nature worship are discovered, and the beginnings of Nature worship are found in all; so that zoic myths and Nature myths, with innumerable intermixtures, are discovered.

Animism, or hecastotheism, is generally found among the tribes of America, perhaps as a survival from a lower stage of mythology. By this statement it is meant that everywhere a tendency is observed to attribute life to many inanimate things, and to assign to such inanimate objects powers of mind, and occasionally physical activities, such as are observed among men and the lower animals. Tylor has discussed this phase of mythology as it has existed in various portions of the world, and has called it *animism;* while the present writer has called it *hecastotheism*, for the reason that animism existed contemporaneously with zoötheism, and even with the beginning of physitheism. When both animate and inanimate beings are held to have occult powers of mind and to perform mysterious acts, hecastotheism is a more appropriate term than the more restricted term animism. While the North American Indians are mainly in the zoötheistic stage of mythology, survivals from hecastotheism and the beginnings of physitheism are found everywhere, but only a few tribes reached an early stage of Nature worship. In the mythologic stage of hecastotheism the animate and inanimate are not clearly differentiated, but everything which is wonderful or mysterious is deified —trees, rocks, fountains, rivers, mountains, all the lower animals, and the objects, powers, and phenomena of the heavens. In zoötheism a distinction is made between the animate and inani-

Navajo fire-dance.

mate, but a few daimons of inanimate objects are found, while the phenomena of the heavens are more exalted; yet animal life occupies the chief attention in this stage. In physitheism daimons and zoic deities are many but inferior, and chief attention is given to the deities of the skies. All these forms of mythology have representation among the North American Indians, but the principal form is zoötheism.

Wherever a new language is found a new system of mythology is discovered. Not only do the personages have different names, but they perform different *rôles* in the drama of creation, change, and life which constitutes the substance of the stories that recount the doings of the gods. A true mythology is always a living belief, and it not only affects the opinions of the people, but it largely influences their acts, and in it they find the origin of the known world, with all its phenomena, and the sanctions for their own habits, customs, and institutions. Tribes speaking languages of a common stock have much of their mythology in common, though a small change of language is always accompanied by some material change in the mythology. But it appears from the evidence, so far as it has been collected, that some myths travel beyond the boundaries of linguistic divisions—that is, myths have been borrowed by one linguistic stock from another, but in passing have been more or less diversified. Yet the same phenomena are usually explained in a somewhat similar manner in all mythologies, and it is difficult, perhaps impossible, to separate those mythologies which have been diffused from some common center, and whose likeness is due to this cause, from those existing among different tribes having a common likeness, due to the interpretations given by analogies common to the savage mind—that is, it is difficult to distinguish between autogenous and syngenous myths. Through the instruction of missionaries and teachers, and by association with white men, especially trappers and hunters, the Indian tribes rapidly acquired some of the ideas of the Christian religion, and readily adopted the belief in a supreme God, whom they usually called by some term signifying Great Spirit. Having listened to many Bible stories, they have often adopted them, and thus at the present time their own mythology is strangely mixed with Bible history.

Every tribe has, besides its living mythology, a great body of folklore—stories of ghosts, giants, pygmies, fairies, and wonderful adventures of various kinds. It is in these stories that animism chiefly appears. Folklore is a phase in general mythology which

is believed by some, not believed by all; and in general the sanctions for customs and institutions are not found therein. Folk-lore among the Indians consists chiefly of tales that are told about the camp-fire, and constitutes a great body of traditional romance.

Religion.—The term *religion* is here used to include the rites, ceremonies, services, and observances performed by a people in worship and in honor of their deities, and to secure their good-will, in order that good may be done to them, and evil averted. Among the tribes of North America such religious acts were very multifarious. In every tribe there was a body of men, vulgarly called by the white explorers "medicine-men," but more appropriately termed "shamans," who were the custodians of mythologic lore; and these shamans recounted to the people the tales of their mythology, their creation myths, and the doings of the gods in general. They were, and still are, also the leaders and chief performers in all religious rites. A great many seasons of worship and festival were observed from time to time, mainly controlled by the phases of the moon, and extending over periods varying from a few hours to several days. Four-day periods were most common, the number 4 usually being the sacred number, symbolic of east, west, north, and south. On such occasions the people listened to the stories of the shaman, and from time to time performed many ceremonies, accompanied by music and dance; in fact, the worship of the North American Indians may be characterized as Terpsichorean. The green-corn dance and the new-moon dance, the hunting dance, the fishing dance, and many others were observed. Such festivals were often carried on until the people became half crazed with excitement, and the more pious devotees often lapsed into the trance state. Sometimes there were wild orgies, beginning with fasting and ending with feasting. On such occasions the shamans and their neophytes were accustomed to use emetics and various intoxicants and narcotics, all of which aided in producing a state of trance, which is everywhere held to be of prime importance as a condition of divination. These Terpsichorean ceremonies were largely invocations for abundant harvests, for rain, for snow, for successful hunting and fishing, and for health and prosperity generally, and on special occasions for success in war. It is difficult to conceive of a more impressive scene than the closing exercises of a war-dance which has been continued for four days, when the hell of human passions seems to be open, and from its jaws pours forth a stream of weird song,

ululation, and imprecation, accompanied with symbolic mimicry of the horrors of war.

Among the more advanced tribes the relation of mythology, Terpsichorean ceremonies, and many strange rites is more thoroughly systematized into dramatic performances. In these religious plays the shaman class constitutes the chief performers, though all the people take part in chorus dancing and singing. It is thus that in savage religion the beginnings of the drama appear. The paraphernalia of this religious drama is very elaborate. The masks found everywhere throughout North and South America were used as the character costumes of the shaman actors in these religious dramas. In this stage well-defined sacrifices were found, exhibited in the burning of food, the sprinkling of meal, and the pouring forth of libations. Sacrifice had its beginning in zoötheism, but is not well defined until Nature worship is reached.

Mortuary practices constitute a special branch of the ceremonies and occurrences of religion. It may be sufficient to note here that all these practices ascertained to exist now, or to have once existed, in any part of the world, have their parallels in some of the tribes and regions of North America. In the class of inhumation are included pit burial, grave burial, burial in stone graves or cists, burial in mounds, burial beneath or in cabins, wigwams, or houses, and cave burial. There are also examples of embalmment or mummification, of urn burial, surface burial, and cairn burial. Cremation, whole or partial, was practiced in some localities. There are also many examples of aërial sepulture, divided into lodge burial, box burial, tree and scaffold burial, partial scaffold burial and ossuaries, and superterrene and aërial burial in canoes. Aquatic burial was not uncommon where the environment was favorable. Corpses were sometimes exposed to be devoured by beasts and birds—not through neglect, but as a rite. In these different forms of burial customs there were special regulations for mourning, sacrifices, feasts, dances, songs, and games; and the erection of marked objects, such as gravestones, at the place of deposit of the remains, was frequent. Mortuary practices among the Indians were affected by the same general ideas regarding the mysteries of life and death, yearning for a future existence, and awe of powers above humanity, as have continued, with modifications, to affect the most civilized peoples. The varieties in the mortuary forms among different tribes and in separated regions were occasioned by diversities of environment, of traditions, of institutions, and of arts.

Cult societies have flourished among very many of the Indian tribes. The purpose of these societies seems to be the systematic performance of religious rites, which are always to a greater or less extent Terpsichorean, and often dramatic. The shamans, who are the leading personages, are the custodians of the tribal lore, and the teachers by whom it is transmitted from generation to generation. They are sorcerers, and perform many feats of magic, to the wonder of the people. In their dramatic performances an elaborate system of religious paraphernalia appears. Such performances are symbolic of the myths of creation, and the shaman actors personify the gods of the Indian cosmogony, and clothe themselves in various costumes, and especially make use of masks to portray more vividly the mythic scenes. These societies do not run parallel with the clans and gentes, but constitute an independent congeries of social bodies. Yet the religious organization is usually curiously and intimately interwoven into the tribal organization, which is designed for civil purposes. Military functions are relegated to both religious and civil authorities. To a large extent the cult societies under the control of the shamans decide whether war or peace shall prevail. They also forecast results, or prophesy, and by divination decide upon the wisdom of measures; but the execution of war is more often a civil function. Usually, though not always, the great captains are shamans.

Indian Languages.

The comparative study of language teaches that the lower the grade of culture in any grand division of mankind the greater is the number of distinct languages. When tribes are in the plane of savagery it is found that in general a very small body of people speak the same tongue. This fact is well exhibited among the aboriginal peoples of America. It has long been a matter of astonishment to many linguists that so many distinct tongues were spoken there. Again and again it has been found that a tribe having but a few score of people speak a language unrelated, so far as can be discovered by philologic research, to that of any other people in the world. In other cases, several languages prove to be more or less distinctly related to one another, so that a stock may be composed of many languages. In North America, the Algonquian, the Siouan, and the Shoshonean stocks are good examples of this composition. Where many languages and dialects belong to the same stock it is usually found that the differentiation thus exhibited is due to the absorption of materials from other lan-

guages, which are often extinct, except so far as a portion of their materials is preserved in the languages by which they have been absorbed. In this manner evidence is afforded that a still greater number of languages existed among the tribes of the continent in some remote past time than at present. Within the historic period throughout the world the loss of languages, except as a few words here and there are preserved by absorption, is a phenomenon well attested, and the same process of diminution seems to have gone on in prehistoric times. All the facts, therefore, lead to the conclusion that they diminish in number with the progress of culture, and that the dialects and languages of the same stock are not properly a phenomenon of multiplication, but attest the disappearance of tongues differing radically from those at present spoken. By this process the conclusion may be reached, with a fair degree of certainty, that primordially a vast number were spoken, that every little tribe developed a language of its own, and that from that stage to the present the number has steadily but surely diminished, so that at the present time comparatively few are spoken.

It has already been mentioned that many languages were spoken by the tribes of North America. The number is so great and the characteristics are so diversified, that any intelligible account of their peculiarities would require a special and voluminous treatise. In the year 1836 Albert Gallatin published the first attempt to classify them. Since that time much has been done in this field of research, and various scholars have added to the work begun by Gallatin, so that a well-founded account can now be given of the families or stocks spoken in North America by the aboriginal tribes.

The terms *family* and *stock* are here applied interchangeably to a group of languages that are supposed to be cognate. A single language is called a stock or family when it is not found to be cognate with any other. Languages are said to be cognate when such relations appear between them that they are supposed to have descended from a common ancestral speech. The evidence of cognation is derived exclusively from the vocabulary. Grammatic similarities are not supposed to furnish evidence of cognation, but to be phenomena in part relating to stage of culture and in part adventitious. It must be remembered that extreme peculiarities of grammar, such as the vowel mutations of the Hebrew or the monosyllabic separation of the Chinese, have not been discovered among Indian tongues. It

therefore becomes necessary, in the classification of Indian languages into families, to neglect grammatic structure, and to consider lexic elements only. But this statement requires further explanation. It is postulated that in the growth of languages new words are formed by combination, and that these new words change by attrition to attain economy of utterance, and also by assimilation (analogy) for economy of thought. In the comparison of languages for the purpose of systematic philology, it often becomes necessary to dismember compounded words for the purpose of comparing the more primitive forms thus obtained. The paradigmatic words considered in grammatic treatises may often be the very words which should be dissected to discover in their elements primary affinities. But the comparison is still lexic, not grammatic.

A lexic comparison is between vocal elements; a grammatic comparison is between grammatic methods—such, for example, as gender systems. The classes into which things are relegated by distinction of gender may be animate and inanimate, and the animate may subsequently be divided into male and female, and these two classes may ultimately absorb, in part at least, inanimate things. The growth of a system of genders may take another course. The animate and inanimate may be subdivided into the standing, the sitting, and the lying, or into the moving, the erect, and the reclined; or, still further, the superposed classification may be based upon the supposed constitution of things, as the fleshy, the woody, the rocky, the earthy, the watery. Thus the number of genders may increase, while further on in the history of a language the genders may decrease so as almost to disappear. All these characteristics are in part adventitious, but to a large extent the gender is a phenomenon of growth, indicating the stage to which the language has attained. A proper case system may not have been established in a language by the fixing of the case particles, or, having been established, it may change by the increase or diminution of the number of cases. A tense system also has a beginning, a growth, and a decadence. A mode system is variable in the various stages of the history of a language. In like manner, a pronominal system undergoes changes. Particles may be prefixed, infixed, or affixed in compound words, and which one of these methods will finally prevail can be determined only in the later stage of growth. All these things are held to belong to the grammar of a language, and to be grammatic methods, distinct from lexic elements.

With terms thus defined, languages are supposed to be cognate when fundamental similarities are discovered in their lexic elements. When the members of a family of languages are to be classed in subdivisions and the history of such languages investigated, grammatic characteristics become of primary importance. The words of a language change by the methods described, but the fundamental elements or roots are more enduring. Grammatic methods also change, perhaps even more rapidly than words, and the changes may go on to such an extent that primitive methods are entirely lost, there being no radical grammatic elements to be preserved. Grammatic structure is but a phase or accident of growth, and not a primordial element of language. The roots of a language are its most permanent characteristics, and while the words which are formed from them may change so as to obscure their elements, or in some cases even to lose them, it seems that they are never all lost, but can in large part be recovered.

The difficulties inherent in the comparative study of American languages, together with the fact that the material on hand, though large in amount, is imperfect, and the complicating conditions that have arisen by the spread of civilization over the country, combine to make the problem intricate. The attempts which have hitherto been made to classify the languages have resulted in much confusion, for the following reasons: First, later authors have not properly recognized the work of earlier laborers in the field; second, the attempt has more frequently been made to establish an ethnic or tribal classification than a linguistic classification; third, linguistic characteristics have been confused with biotic peculiarities, arts, habits, customs, and other human activities, so that the radical differences of language have often been ignored, and slight differences have been held to be of primary value.

The attempts at a classification of these languages and a corresponding classification of ethnic divisions have led to the development of a complex, mixed, and inconsistent synonymy, which must first be unraveled, and a selection of standard names made therefrom according to fixed principles.

It is manifest that, until proper rules are recognized by students specially engaged in researches concerning the languages of North America, the establishment of a determinate nomenclature is impossible. It is therefore necessary to set forth the rules that have been adopted, together with brief reasons for their choice.

A fixed nomenclature in biology has proved to be not only advantageous but a prerequisite to progress in research, as the vast multiplicity of facts, ever accumulating, would otherwise overwhelm the scholar. In philologic classification fixity of nomenclature is of corresponding importance; and while the analogies between linguistic and biotic classification are limited—many of the principles of nomenclature which biologists have adopted having no application in philology—still, in some important particulars the requirements of all scientific classifications are alike; and though many of the nomenclatural points met with in biology do not occur in philology, some of them do occur and may be governed by the same rules. What is now needed is a rule of some kind leading scholars to use the same terms for the same things; and it would seem to matter little in the case of linguistic stocks what the nomenclature is, provided it becomes denotive and universal.

In treating of the languages of North America it has been suggested that the names adopted should be the names by which the people recognize themselves; but this is a rule of impossible application, for where the branches of a stock diverge very greatly no common name for the people can be found. Again, it has been suggested that names which are to become permanent in science should be simple and euphonic. This also is impossible of application, as it would involve invention and distortion, with no recognized standard. Simplicity and euphony are largely questions of personal taste, and he who has studied many languages loses speedily his idiosyncrasies of likes and dislikes, and learns that words foreign to his vocabulary are not necessarily repulsive.

Biologists have decided that the author who first distinctly characterizes and names a species or other group shall thereby cause the name thus used to become permanently affixed, but under certain conditions adapted to a growing science which is continually revising its classifications. This law of priority may well be adopted by philologists. By its application it will occasionally happen that a name must be taken which is objectionable or which could be much improved. But if names may be modified for any reason, the extent of change that may be wrought in this manner is unlimited, and such modifications would ultimately become equivalent to the introduction of new names, and a fixed nomenclature would thereby be overthrown. On the whole, it has been deemed necessary to adopt the rule of priority.

As there are many linguistic families in North America, in a number of which there are many tribes speaking diverse languages, it becomes important that some form should be given to the family name by which it may be distinguished from the name of a single tribe or language. In many cases, some one language within a stock has been taken as the type and its name given to the entire family; so that the name of a language and that of the stock to which it belongs are identical. This would be inconvenient and lead to confusion. For such reasons it has been decided to give each family name the termination "an" or "ian."

LINGUISTIC DIVISIONS. The following is a classification of the linguistic families of Indians in North America north of Mexico, including the peninsula of Lower California and so much of Mexico as is required to show the range of families common to that country and the United States. The principal tribes or divisions of the several families are also noted when distinctly ascertained and of importance.

Algonquian Family. The principal tribes are: Abnaki, Algonquin, Arapaho, Cheyenne, Conoy, Cree, Delaware, Fox, Illinois, Kickapoo, Mahican, Massachuset, Menominee, Miami, Micmac, Mohegan, Montagnais, Montauk, Munsee, Nanticoke, Narraganset, Nauset, Nipmuc, Ojibwa, Ottawa, Pamlico, Pennacook, Pequot, Piankishaw, Pottawotomi, Powhatan, Sac, Shawnee, Siksika, Wampanoag, Wappinger.

Athapascan Family. The principal tribes are divided into groups, as follows: Northern group—Ah-tena, Kaiyuh-khotana, Kcaltana, K'naia-khotana, Koyukukhotana, Kutchin, Montagnais, Montagnards, Nagailer, Slave, Sluacus-tinneh, Taculli, Tahl-tan, Unakhotana. Pacific group—Âtaâkût, Chasta, Costa, Chetco, Dakube tede, Hupâ, Kălts'erea tûnnĕ, Kenesti or Wailakki, Kwalhioqua, Kwajami, Micikqwutme tûnnĕ, Mikono tûnnĕ, Naltûnne tûnnĕ, Owilapsh, Qwinctûnnetûn, Saiaz, Taltûctun tûde, Tcêmê (Joshuas), Tcĕtlĕstcan tûnnĕ, Terwar, Tlatscanai, Tolowa, Tutu tûnnĕ. Southern group—Arivaipa, Chiricahua, Coyotero, Faraone, Gileño, Jicarilla, Lipan, Llanero, Mescalero, Mimbreño, Mogollon, Na-isha, Navajo, Pinal Coyotero, Tchikûn, Tchishi.

Attacapan Family.

Beothukan Family.

Caddoan Family. The principal tribes are: Pawnee, divided into Grand Pawnee, Tappas, Republican Pawnee, and Skidi; Arikara, Wichita, Kichai, Caddo, Adaize.

Chimakuan Family. The principal tribes are: Chimakum, Quileute.

Chimarikan Family. The principal tribes are: Chimariko, Chimalakwe.

Chimmesyan Family. The principal tribes are: Násqa, divided into Násqa and Gyitksán; Tshimshian proper, divided into Ts'emsián, Gyits'umrä'lon, Gyits'aláser, Gyitqā'tla, Gyitgā'ata, and Gyidsedzó.

Chinookan Family. Principal tribes: Lower Chinook, divided into Chinook and Clatsop; Upper Chinook, divided into Cathlamet, Cathlapotle, Chilluckquittequaw, Clackama, Cooniac, Echeloot, Multnoma, Wahkiacum, and Wasco.

Chitimachan Family.

Chumashan Family.

Coahuiltecan Family. Principal tribes: Alasapa, Cachopostate, Casa chiquita, Chayopine, Comecrudo, Cotoname, Mano de perro, Mescal, Miakân, Orejone, Pacuache, Pajalate, Pakawa, Pamaque, Pampopa, Pastancoya, Patacale, Pausane, Payseya, Sanipao, Tâcame, Venado.

Copehan Family. The principal tribes are: Patwin, divided into Chenposel, Guilito, Korusi, Liwaito, Lolsel, Makhelchel, Malaka, Napa, Olelato, Olposel, Suisun, Todetabi, Topaidisel, Waikosel, Wailaksel; Wintu, divided into Daupom, Nomlaki, Nommuk, Norelmuk, Normuk, Waikenmuk, Wailaki.

Costanoan Family.

Eskimauan Family. The principal tribes and villages are as follows: Greenland group—East Greenland villages: Akorninak, Aluik, Anarnitsok, Angmagsalik, Igdlolnarsuk, Ivimiut, Kemisak, Kikkertarsoak, Kinarbik, Maneetsuk, Narsuk, Okkiosorbik, Sermiligak, Sermilik, Taterat, Umanak, Umerik. West Coast villages: Akbat, Karsuit, Tessuisak. Labrador group—Itivimiut, Kiguaqtagmiut, Suginimiut, Taqagmiut. Middle group—Aggomiut, Ahaknanelet, Aivillirmiut, Akudliarmiut, Akudnirmiut, Amitormiut, Iglulingmiut, Kangormiut, Kinnepatu, Kramalit, Nageuktormiut, Netchillirmiut, Nugumiut, Okomiut, Pilingmiut, Sagdlirmiut, Sikosuilarmiut, Sinimiut, Ugjulirmiut, Ukusiksalingmiut. Alaska group—Chiglit, Chugachigmiut, Ikogmiut, Imahklimiut, Inguhklimiut, Kaialigmiut, Kangmaligmiut, Kaviagmiut, Kittegareut, Kopagmiut, Kuagmiut, Kuskwogmiut, Magemiut, Mahlemiut, Nunatogmiut, Nunivagmiut, Nushagagmiut, Nuwungmiut, Oglemiut, Selawigmiut, Shiwokugmiut, Ukivokgmiut, Unaligmiut. Aleutian group—Atka, Unalashka. Asiatic group—Yuit.

Esselenian Family.

Iroquoian Family. The principal tribes are: Cayuga, Cherokee, Conestoga, Erie, Mohawk, Neuter, Nottoway, Oneida, Onondaga, Seneca, Tionontate, Tuscarora, Wyandot.

Kalapooian Family. The principal tribes are: Ahántchuyuk, Átfalati, Calapooya, Chelamela, Lákmiut, Santiam, Yámil, Yonkalla.

Karankawan Family.

Keresan Family. The divisions or villages are: Acoma, Acomita, Cochití, Hasatch, Laguna, Paguate, Pueblito, Punyeestye, Punyekia, Pusityitcho, San Felipe, Santa Ana, Santo Domingo, Seemunah, Sia, Wapuchuseamma, Ziamma.

Kiowan Family.

Kitunahan Family. The principal tribes are: Cootenai, or Upper Cootenai; Akoklako, or Lower Cootenai; Klanoh-Klatklam, or Flathead Cootenai; Yaketahnoklatakmakanay, or Tobacco Plains Cootenai.

Koluschan Family. The tribes are: Auk, Chilcat, Hanega, Hoodsunu, Hunah, Kek, Sitka, Stahkin, Tagish, Taku, Tongas, Yakutat.

Kulanapan Family. The tribes are: Balló Kaì Pomo, Batemdikáyi, Búldam Pomo, Chawishek, Choam Chadila Pomo, Chwachamajú, Dápishul Pomo, Eastern People, Erío, Erússi, Gallinoméro, Gualála, Kabinapek, Kaimé, Kai Pomo, Kastel Pomo, Kato Pomo, Komácho, Kulá Kai Pomo, Kulanapo, Láma, Misálamagūn or Musakakūn, Mitoám Kai Pomo, Poam Pomo, Senel, Shódo Kaí Pomo, Síako, Sokóa, Yokáya Pomo, Yusâl Pomo.

Kusan Family. The tribes are: Anasitch, Melukitz, Mulluk or Lower Coquille, Nacu.

Lutuamian Family. The tribes are: Klamath, Modoc.

Mariposan Family. The tribes are: Ayapaì, Chainímaini, Chukaímina, Chūk'chansi, Chunut, Coconūn, Ititcha, Kassovo, Kau-í-a, Kiawétni, Mayáyu, Notoánaiti, Ochíngita, Pitkachì, Pohállin Tinleh, Sawákhtu, Táchi, Télumni, Tinlinneh, Tisèchu, Wíchikik, Wikchúmni, Wíksachi, Yúkol.

Moquelumnan Family. The principal tribes are: Miwok division—Awani, Chauchila, Chumidok, Chumtiwa, Chumuch, Chumwit, Hettitoya, Kani, Lopolatimne, Machemni, Mokelumni, Newichumni, Olowidok, Olowit, Olowiya, Sakaiakumni, Seroushamne, Talatui, Tamoleka, Tumidok, Tumun, Walakumni, Yuloni. Olamentke division—Bollanos, Chokuyem, Guimen, Likatuit, Ni-

cassias, Numpali, Olamentke, Olumpali, Sonomi, Tamal, Tulare, Utchium.

Muskhogean Family. The principal tribes are: Alibamu, Apalachi, Chicasa, Choctaw, Creek or Maskoki proper, Koasáti, Seminole, Yamacraw, Yamasi.

Natchesan Family. The principal tribes are: Na'htchi and Taensa.

Palaihnihan Family. The principal tribes are: Achomâ'wi, Atuámih, Chumâ'wa, Estakéwach, Hantéwa, Humâ'whi, Ilmâ'wi, Pakamalli.

Piman Family. The principal tribes are: Northern group—Opata, Papago, Pima. Southern group—Cahita, Cora, Tarahumara, Tepeguana.

Pujunan Family. Principal tribes: Bayu, Boka, Eskin, Hélto, Hoak, Hoankut, Hololúpai, Koloma, Konkau, Kúl'meh, Kulomum, Kwatóa, Nakum, Olla, Otaki, Paupákan, Pusúna, Taitchida, Tíshum, Toamtcha, Tosikoyo, Toto, Ustóma, Wapúmni, Wima, Yuba.

Quoratean Family. The tribes are: Ehnek, Karok, and Pehtsik.

Salinan Family.

Salishan Family. The principal tribes are: Atnah, Bellacoola, Chehalis, Clallam, Colville, Comux, Copalis, Cowichin, Cowlitz, Dwamish, Kwantlen, Lummi, Met'how, Nanaimo, Nanoos, Nehalim, Nespelum, Nicoutamuch, Nisqualli, Nuksahk, Okinagan, Pend d'Oreilles, Pentlatc, Pisquow, Puyallup, Quaitso, Queniut, Queptlmamish, Sacumehu, Sahewamish, Salish, Samamish, Samish, Sanetch, Sans Puell, Satsop, Sawamish, Sekamish, Shomamish, Shooswap, Shotlemamish, Skagit, Skihwamish, Skitsuish, Skokomish, Skopamish, Sktehlmish, Smulkamish, Snohomish, Snoqualmi, Soke, Songish, Spokan, Squawmisht, Squaxon, Squonamish, Stehtsasamish, Stillacum, Sumass, Suquamish, Swinamish, Tait, Tillamook, Twana.

Sastean Family.

Shahaptian Family. Principal tribes: Chopunnish (Nez Percé), Klikitat, Paloos, Tenaino, Tyigh, Umatilla, Walla Walla.

Shoshonean Family. The principal tribes are: Bannock, Chemehuevi, Comanche, Gosiute, Pai Ute, Paviosto, Saidyuka, Shoshoni, Tobikhar, Tukuarika, Tusayan, Uta.

Siouan Family. The principal tribes are: I. Dakota—(*A*) Santee, includes Mdé-wa-kan-ton-wan and Wa-qpé-ku-te. (*B*) Sisseton. (*C*) Wahpeton. (*D*) Yankton. (*E*) Yanktonnais, di-

Scene in a court-yard of Laguna Pueblo, New Mexico; the corn-dance in progress.

vided into Upper and Lower. (*F*) Teton, including (*a*) Brulé, Upper Brulé, and Lower Brulé; (*b*) Sans Arcs; (*c*) Blackfeet; (*d*) Minneconjou; (*e*) Two Kettles; (*f*) Ogalalla, including Wa-za-za and Loafers; (*g*) Uncpapa. II. Assinaboin. III. Omaha. IV. Ponca. V. Kaw. VI. Osage—Big Osage, Little Osage, Arkansas Band. VII. Quapaw. VIII. Iowa. IX. Otoe. X. Missouri or Missouria. XI. Winnebago. XII. Mandan. XIII. Gros Ventres. XIV. Crow—Absaruqe, Aubsaroke, etc. XV. Tutelo. XVI. Biloxi. XVII. Catawba. XVIII. Woccon.

Skittagetan Family. The principal tribes or villages are: Haida, divided into Aseguang, Cumshawa, Kayung, Kung, Kunxit, Massett, New Gold Harbor, Skedan, Skiteiget, Tanu, Tartanee, Uttewas; Kaigani, divided into Chatcheeni, Clickass, Howakan, Quiahanless, Shakan.

Takilman Family.

Tañoan Family.

Timuquanan Family. The principal tribes are in groups, as follows: (*A*) Shores of St. John's River, from mouth to sources—Patica, Saturiwa, Atore, Homolua or Molua, Alimacani, Casti, Malica, Melona, Timoga or Timucua, Enecaqua, Choya, Edelano (island), Astina, Utina, Patchica, Chilili, Calanay, Onochaquara, Mayarca, Mathiaca, Maiera, Mocoso, Cadica, Eloquale, Aquonena. (*B*) On a (fictitious) western tributary of St. John's River, from mouth to source—Hicaranaou, Appalou, Oustaca, Onathcaqua, Potanou, Ehiamana, Anouala. (*C*) East Floridian coast, from south to north—Mocossou, Oathcaqua, Sorrochos, Hanocoroucouay, Marracou. (*D*) On coast north of St. John's River—Hiouacara. (*E*) Acquera, Aguile, Basisa or Vacissa, Cholupaha, Hapaluya, Hirrihiqua, Itafi, San Mateo, Santa Lucia de Acuera, Tacatacuru, Tocaste, Tolemato, Topoqui, Itara, Machaua, Napetuca, Osile (Oxille), San Juan de Guacara, Tucururu, Ucita, Urriparacuxi, Yupaha (perhaps a province).

Tonikan Family.

Tonkawan Family.

Uchean Family.

Waiilatpuan Family. The principal tribes are: Cayuse and Molale.

Wakashan Family. The principal tribes are as follows: Aht division—Ahowsaht, Ayhuttisaht, Chicklesaht, Clahoquaht, Hishquayquaht, Howchuklisaht, Kitsmaht, Kyoquaht, Macaw, Manosaht, Mowachat, Muclaht, Nitinaht, Nuchalaht, Ohiaht, Opechisaht,

Pachenaht, Seshaht, Toquaht, Yuclulaht. Haeltzuk division—Aquamish, Belbellah, Clowetsus, Hailtzuk, Haishilla, Kakamatsis, Keimanoeitoh, Kwakiutl, Kwashilla, Likwiltoh, Mamaleilakitish, Matelpa, Nakwahtoh, Nawiti, Nimkish, Quatsino, Tsawadinoh.

Washoan Family.

Weitspekan Family. The principal tribes are: Chillúla, Mita, Pekwan, Rikwa, Regua, Sugon, Shragoin, Weitspek.

Wishoskan Family. The tribes are: Patawat, Weeyot, and Wishosk.

Yakonan Family. The tribes are: Alsea, Yakwĭ'na, Kuitc, and Siuslaw.

Yanan Family.

Yukian Family. The principal tribes are: Ashochimi, Chumaya, Napa, Tatu, Yuki.

Yuman Family. The principal tribes are: Cochimi, Cocopa, Cuchan or Yuma proper, Diegueño, Havasupai, Maricopa, Mohave, Seri, Waicuru, Aalapai.

Zuñian Family.

Properly to appreciate the difficulties in the classification above mentioned, it must be remembered that nearly all of the names given, both those of families and of tribes, have at least one synonym, and that many of them have a considerable number of synonyms, often wholly unlike both in sound and in literation.

The linguistic families contained in the above list are exhibited by the different colors or patterns upon the map presented herewith, the total number of families contained in the whole area being fifty-seven. It is believed that the families of languages represented upon the map did not spring from a common source; they are as distinct from one another in their vocabularies, and apparently in their origin, as they are from the Aryan or the Semitic families. Further and more critical study will probably result in the fusion of some of these families. As the means for analysis and comparison accumulate, resemblances now hidden will be brought to light, and relationships hitherto unsuspected will be shown to exist. Such a result may be anticipated with the more certainty because the present classification has been made upon a conservative plan. Where relationships between families are suspected, but can not be demonstrated by convincing evidence, it has been deemed wiser not to unite them, but to keep them apart, until more material shall have accumulated and proof of a more decisive character shall have been brought forward. While some of the families indicated on the map may in future be

united to other families, and the number may thus be reduced, there seems to be no ground for the belief that the total of the linguistic families of North America will be materially diminished, at least under the present methods of analysis; for there is little reason to doubt that, as the result of further investigation in the field, there will be discovered tribes speaking languages not classifiable under any of the present families; thus the decrease in the total by reason of consolidation may be compensated by a corresponding increase through discovery. It is even possible that some of the similarities used in combining languages into families may, on further study, prove to be adventitious, and the number of groups may be thereby increased. It remains for the future to reveal upon which side the numerical balance will fall.

As stated above, all the families occupy the same basis of dissimilarity from one another—i. e., none of them are related—and consequently no two of them are either more or less alike than any other two, except in so far as mere coincidences and borrowed material may be said to constitute likeness and relationship. Coincidences in the nature of superficial word resemblances are common in all languages of the world. No matter how widely separated geographically two families of languages may be, no matter how unlike their vocabularies, how distinct their origin, some words may always be found which appear upon superficial examination to indicate relationship. There is not a single Indian linguistic family, for instance, which does not contain words similar in sound, and more rarely similar in both sound and meaning, to words in English, Chinese, Hebrew, and other languages. Such resemblances have been discovered and pointed out, not as mere accidental similarities, but as proof of genetic relationship. Borrowed linguistic material also appears in every family, tempting the unwary investigator into making false analogies and drawing erroneous conclusions. Neither coincidences nor borrowed material, however, can be properly regarded as evidence of cognation.

It will be observed that, while occupying the same plane of genetic dissimilarity, the Indian families of North America are by no means alike as regards either the extent of territory occupied, the number of tribes grouped under them respectively, or the number of languages and dialects of which they are composed. The list and map show that some of the families cover wide areas, the dimensions of which are stated in terms of latitude and longitude rather than by miles. Others occupy so little space that the marks representing them are hardly discernible upon the map.

Some of them contain but a single tribe; others are represented by scores of tribes. In the case of a few, the term "family" is commensurate with language, since there is but one language and no dialects. In the case of others, their tribes spoke several languages, so distinct from one another as to be for the most part mutually unintelligible, and the languages shade into many dialects more or less diverse.

Sign Language. A special result followed from the fact that in North America a comparatively small number of inhabitants were scattered over a very large space, separated by many linguistic and dialectic boundaries. Each of the distinctly different tongues was for an indefinitely long period confined to a few speakers, who were verbally incomprehensible to all other persons who did not, from some rarely operating motive, laboriously acquire their language. Sign language anciently was, and still is, used between persons who can not speak at all, or who can not speak a com-

Petroglyph at Mesa Pintada.

mon language. For the necessary intercommunication between members of different American tribes, it resulted that the medium of sign language was either retained, or perfected (according as its original relation in time to oral speech may be considered) to a degree beyond that known in any other part of the world. The

signs used over the continent are not identical for the same concepts or objects, though they are founded on the same principle and are therefore intelligible to all sign-talkers. A sufficient number, however, had been so long and frequently used by neighboring tribes as to have become conventional, and thereby groups were established whose tribes could communicate with greater ease than with other tribal groups which had evolved other conventions. In later times, when a language had become predominant over a large region, or when a verbal jargon was adopted, the language of signs decayed.

Picture Writing. This is another form of expressing thoughts and noting facts, which is intimately connected with sign language,

Characters sculptured on sandstone, Arizona.

and is of great antiquity in most parts of the world, but has generally become disused. In America, however, its employment is still current, and it can therefore be studied as in actual existence applied to records and communications, without dependence wholly on inference and hypothesis. Its chief intrinsic interest is in the ideography it displays, but historically it is important from the fact that in it have originated all the current alphabets and syllabaries of the world. This step in evolution had apparently just been commenced in America when it was arrested by European invasion, as its partial transition into signs of sound appears in the Aztec and Maya characters. The rock carvings in the area occupied by the map above presented may be grouped in accordance with the typical styles of their characters and

workmanship, and to some extent correspond with the largest linguistic divisions, but are also strongly affected by the physical characteristics of the several regions in which they are found.

Indian History and Migrations.

The traditions of the Indians, corroborated by the accounts of early European explorers who penetrated to tribes remote from the civilized frontier, afford sufficient historic material to show that those tribes, though speaking different languages and organized into different bodies politic, still usually lived at peace with one another, and held much intercourse, especially at times of festival. A custom of almost unbounded hospitality existed among all of them, and the best energies of the people were expended in preparing feasts and gifts for visiting neighbors. Comparatively little barter occurred between tribes, but instead of it gifts were extensively interchanged. The advent of the Europeans largely broke up this peaceful life. The whole land had been substantially divided into districts by well-marked natural boundaries, each district being in the possession of some tribe or confederacy, the members of which had the exclusive right to cultivate the soil, to hunt, to fish, and to gather fruits therein. But as the European invasion proceeded, tribe after tribe was driven from its ancestral home and thrown back beyond its boundary into the dwelling-place of some other tribe or tribes. Thus tribes encroached on tribes, and intertribal war resulted. Often the encroaching tribes were furnished to a greater or less degree with firearms. Sometimes the tribes which thus came into compulsory contact united with each other by amicable treaty, but those which were possessed of superior weapons generally acted as merciless conquerors.

The acquisition of the horse and the possession of firearms wrought great changes in aboriginal habits. The horse enabled the Indian of the treeless plains to travel with ease and celerity distances which before were practically impossible, and the possession of firearms stimulated tribal aggressiveness to the utmost pitch. Firearms were doubly effective in producing changes in tribal habitats, since the quite gradual introduction of trade placed these deadly weapons in the hands of some tribes, and of whole congeries of tribes, long before others could obtain them. Thus the general state of tribal equilibrium, which had before prevailed, was rudely disturbed. Tribal warfare, which hitherto had been attended with inconsiderable loss of life and slight ter-

Shoshone village.

ritorial changes, was now made extremely destructive, and the territorial possessions of whole groups of tribes were augmented at the expense of those less fortunate. The horse made nomads of many tribes which there is sufficient evidence to show were before nearly sedentary. Firearms compelled migration and caused thorough changes in the habitats of tribes, to effect which in the natural order of events would have required many centuries. The changes resulting from these combined agencies, great as they were, are, however, slight in comparison with the tremendous effects of the sweeping occupancy of Indian territory by Europeans. As that proceeded, a wave of migration was started first from east to west, and was afterward met by another from the Pacific coast, both of which affected tribes far remote from the inceptive point of disturbance, ever forcing them within narrower and narrower bounds, and, as time went on, producing greater and greater changes throughout the entire country.

The system of village life was rapidly destroyed by other effects of the gifts of civilization. The Indians were not only provided with firearms, and in many parts of the country with horses and with various traps and snares invented by civilized man, but were also furnished by the invaders with a market for furs. A seminomadic life was thereby initiated, and village life, with agriculture, seed gathering, and fishing, was more or less abandoned. But this successful hunting led to the destruction of the game, and wild animals were to some extent replaced by domesticated animals originally obtained from the white man, and thus among a large number of tribes a real nomadic life was established.

North America was settled from various European states, and each state sought to establish colonies, tributary and obedient to the mother country. This led to wars between colonies. In these intercolonial wars the Indian tribes were often enlisted and furnished with firearms, and they speedily developed a mode of warfare half savage and half civilized. The warfare which they learned as allies of colonies they soon used for other purposes, and tribe made war on tribe, and the ranks of the Indians were thus greatly thinned. At various times, and in many parts of the land, they turned their arms against the white settlers, ultimately to be defeated and to be still further diminished in numbers. Thus, by intercolonial wars, by intertribal wars, and by border wars against the civilized settlers, their population rapidly decreased. But the contact between savage tribes and civilized

men was not wholly, nor chiefly, one of warfare. The Indian everywhere speedily acquired some of the arts of the invader. Many learned to speak a European tongue. Missionaries and teachers were sent among them from the very first settlement of the country, and these pious, patient, and tireless agents spread the elements of the new religion in the wilderness. Some of the tribes became herdsmen, a few learned to cultivate the soil by civilized methods, and gradually tribe after tribe entered into treaty relations with the civilized peoples, and, adopting some of the civilized habits, settled down to peaceful life.

The invaders who belonged to the Latin peoples, especially the French and Spanish, generally intermarried with the aborigines. Thus, in Canada there is an extensive body of mixed-blood people, French-Indian. In the southeastern portion of the United States, and still southward through Mexico, the Spanish immigrants intermarried with the Indians, and the people usually known as "Mexicans" are these half-breeds. The English, Irish, Germans, and Scandinavians pursued a different course. They refused to intermarry with the natives, but, on the other hand, attempted to induct them into the ways of civilization by teaching them the industrial arts, inducing them to become agriculturists, and establishing schools among them. This policy began in the colonial times, and on the organization of the Government of the United States it was definitely formulated into law, a system of governmental supervision being organized for the purpose. The policy thus inaugurated by the founders of the Government has with very little alteration continued to the present time. From time to time, as administrations have changed, the policy has been reformulated, and new vigor has been infused into the administration of Indian affairs. But the Indians themselves never looked with favor upon this policy. They desired to remain in possession of their ancestral homes and hunting-grounds, and did not wish to engage in civilized labors; so they generally resisted the efforts of the missionaries and teachers. But the filling of the country by civilized men proceeded, and valley after valley was occupied, and the primeval life of the Indian was inexorably doomed.

From the foundation of the Government to the present time the attempt has been made to induce Indians to take land in severalty, and treaty after treaty has been made giving reservations to the tribes. These were at first large enough to afford them hunt-

ing and fishing grounds of more or less value, but never sufficient for their complete support in this manner. Such reservations were granted always with the purpose, expressed or implied in the treaties or agreements, that the Indians should become herdsmen and agriculturists. In the earlier administration of affairs the attempts to induce the Indians to take lands in severalty were rarely successful, but in later years they have commenced to see the importance, and even the necessity, of securing permanent homes for themselves in this manner. There are two practical impediments in Indian society that must be overcome before this desirable end can be reached. The first arises from the fact that among these tribal peoples ownership of land in severalty was unknown, tribal or confederate ownership only being recognized. Thus their traditional laws and customs were opposed to it, and they looked with the same horror upon individual ownership in the land with which they would have regarded the ownership of the air or the water, and it was everywhere radically opposed by the dictates of tribal mythology. The second difficulty inheres in the system of inheritance existing among the Indian tribes. As before mentioned, most of the tribes were organized into clans by kinship reckoned in the female line. Some property was inherited by the tribe, other property by the clan, but direct inheritance by individual from individual was unknown; and the little personal property held by a person was sometimes destroyed at his death, under religious sanction, to prevent contention over it. Under clan organization, with descent in the female line, the children belong to the mother's clan, not to the father's. Thus the children inherit as a member of their mother's clan. When an Indian man has acquired a tract of land under the laws of the United States, at his death his own children fail to claim it and his sister's children demand it, for such with them is the primitive law of descent, which would determine inheritance when the latter became recognized. But gradually civilized systems of descent and inheritance have become popular from recognition of their necessity. Many tribes have already formally adopted civilized customs and laws. The Indians themselves realize that in order to secure lands they must own them in severalty, and that hunting-grounds can not be preserved for their exclusive use. Much more than half of the Indians of the United States have accepted these principles in good faith, and all the rest are contemplating them with more favor from year to year. In general, the lands reserved for this purpose by the Government are sufficient to make the Indians prosperous

and wealthy, though in a few instances ample provision for this purpose has not been made.

It is interesting to notice that the intermarrying policy of the Latin peoples has in the main been productive of immediate peace, while the civilizing policy of other European settlers has led to many difficulties, often characterized by petty warfare, with accompanying cruelties and horrors; but the civilizing policy has saved the white race from a serious degradation, and the tribes which have been forced into civilization are superior to the mixed blood peoples.

The accompanying linguistic map, based as it is upon the best evidence obtainable, itself offers conclusive proof not only that the Indian tribes were in the main sedentary at the time they were first met by Europeans, but that they had been sedentary for a very long period. It will be noticed that the colors or patterns representing the several linguistic families are usually in single bodies—i. e., that they represent continuous areas —and that with some exceptions the same color is not scattered here and there over the map in small spots. Yet the latter condition is precisely what would be expected had the tribes representing the families been in any marked degree nomadic. If nomadic tribes had occupied North America, instead of spreading out each from a common center, as the patterns show that the tribes composing the several families actually did, they would have been dispersed here and there over the whole face of the country. That they are not so dispersed is proof that in the main they were sedentary. Migrations more or less extensive of some tribes over the country had taken place prior to European occupancy. This fact is disclosed by a glance at the present map. The great Athapascan family, for instance, occupying the larger part of British America, is known from linguistic evidence to have sent off colonies into Oregon, California, Arizona, and New Mexico. How long before European discovery of this country these migrations took place can not be told, but in the case of most of them it was undoubtedly many years. By the test of language it is seen that the great Siouan family, which had been regarded as almost exclusively Western, had one offshoot in Virginia (Tutelo), another in North and South Carolina (Catawba), and a third in Mississippi (Biloxi); and the Algonquian family, so important in the early history of the country, while occupying a nearly continuous area in the North and East, has yet secured a foothold, probably in comparatively recent times, in Wyoming and Colo-

NORTH PACIFIC OCEAN
ATHAPASCAN
ESKIMAUAN
ALGONQUIAN
SIBERIA
BERING STRAIT
ICELAND
GREENLAND
BAFFIN BAY
DAVIS STRAIT
HUDSON STRAIT
HUDSON BAY
C. Churchill
Port Nelson
Southampton I.
Fox Channel
Fox Land
Cumberland I.
North Cumberland Islet
Banks Land
Baring Land
Prince Albert Land
Melville Island
Cockburn Island
GULF OF BOOTHIA
Boothia Peninsula
Repulse Bay
Wager Inlet
Hecla I.
Cape Bould
Belcher Is.
Coningham Islands
W. Hope
GULF OF ST. LAWRENCE
C. Henrietta Maria
JAMES BAY
Moose Factory
KOLUSCHAN
SKITTAGETAN
TSIMSHEAN
HAIDAN
WAKASHAN
SALISHAN
CHIMAKUAN
CHINOOK
ATHAPASCAN
SALISHAN
TLATPUAN
YAKUTAT
NOOTKAN
OFFRIS

LINGUISTIC STOCKS OF AMERICAN INDIANS
NORTH OF MEXICO

J. W. POWELL

rado. These and other similar facts sufficiently prove the power of individual tribes or gentes to sunder relations with the great body of their kindred and to remove to distant homes. Tested by linguistic evidence, such instances appear to be exceptional, and the fact remains that, in the great majority of cases, the tribes composing linguistic families occupied continuous areas, and hence were and long had been practically sedentary. Nor is the bond of a common language, strong and enduring as that bond is usually thought to be, entirely sufficient to explain the phenomenon here pointed out. The linguistic tie would undoubtedly aid in binding together the members of a tribe when small in number, but as the people speaking a common language increase in numbers and come to have conflicting interests, the linguistic tie has often proved to be an insufficient bond of union. In the case of the Indian tribes, feuds and internecine conflicts were common between members of the same linguistic family. In fact, it is probable that a very large number of the dialects into which Indian languages are split originated as the result of such internal strife. Factions, divided and separated from the parent body, developed distinct dialects or languages by contact, intermarriage, and incorporation with foreign tribes.

But the proof that the North American Indians were not nomadic does not depend upon linguistic evidence alone. Corroboration of their sedentary character is found in the form of kinship system, with mother-right as its chief factor, which has before been explained, but which is of such transcendent and pervading import that it must be reiterated. This system is not adapted to the necessities of nomadic tribes, which need to be governed by a patriarchal system, and also to be possessed of flocks and herds.

There is also an abundance of historic evidence to show that, when first discovered by Europeans, the Indians of the eastern United States were found living in fixed habitations. This does not necessarily imply that the entire year was spent in one place. Agriculture not being practiced to an extent sufficient to supply the Indians with full subsistence, they were compelled to make occasional or periodic journeys in large or small parties from their permanent home to the more or less distant waters and forests to procure supplies of food. When furnished with food and with skins for clothing, the hunting and fishing parties returned to the village which was their true home. At longer periods, for several reasons—chiefly the hostility of stronger

tribes, a failure of the fuel supply near the village, and the compulsion exercised by potent superstitions—the villages were abandoned and new ones formed, usually at no great distance from the old, to constitute new homes, new points from which to set out on and return from their hunts and expeditions. The tribes of the eastern United States had fixed and definitely bounded habitats, and their marches were in the nature of temporary excursions to established points resorted to from time immemorial. As, however, they had not yet entered completely into the agricultural condition, to which they were fast progressing from the hunter state, they may be said to have been nomadic to a very limited extent. This method of life also prevailed, though to a less degree, in the Pacific States. Upon the Pacific coast proper the tribes were even more sedentary than upon the Atlantic, as the mild climate and the great abundance and permanent supply of fish and shellfish left no cause for a seasonal change of abode.

Indian Population.

During many years all the authorities agreed in the supposition, which until recently remained uncontradicted, that the Indian population of North America at the time of its discovery was very large, some estimates amounting to sixteen millions, and others still higher. That their present numbers, as lately enumerated and estimated with approximate accuracy, show so great a decrease has been explained by a theory that the Indian race is afflicted with an innate defect by which its civilization, or even existence in civilized environments, is impossible. The statement and the theory are both erroneous. The pre-Columbian population was astonishingly small as compared with the enormous extent of territory, and during late decades, when the influence of civilization has been strongest, no important decrease has been noted; indeed, some tribes which are most nearly civilized have increased. Some of the reported decrease has occurred, not through extinction, but through absorption—a common event in history. The present number of Indians in the United States is not much less than three hundred thousand. The number of those in the Dominion of Canada is not so accurately known. The statistical accounts relative to the present and former Indian population of Mexico are not trustworthy.

In 1877, Colonel Garrick Mallery, of the Bureau of Ethnology, published the results of his investigation into the former and present numbers of the Indians of the United States, which sug-

gested some causes for the exaggerated statements of the early authorities, apart from the mere concerted boasting or crafty pretension of the Indians themselves, which also had their effect. The European explorers and pioneers used the only readily available highways of seacoast and river, near which the Indians, for convenience of food supply, were most numerous and stationary. The early explorers seldom traversed the vast inland forests and plains, which, when examined, showed that no Indian was habitually there. If an expedition through the wilderness was undertaken—which was seldom, as it required large cost and a strong armed force—its passage attracted from curiosity all the tribes scattered over a large region. This congregation would naturally imply to the members of such expeditions which first explored the interior that wherever they might go the Indians were there living in large numbers. It was seldom that any competent explorer could overcome the immense distances of separation so as to have opportunity to examine personally and accurately any large number of tribes; therefore they and their permanent habitat were not identified.

A similar source of error arose from the fact that, though the American Indians were not nomadic, most of them for convenience changed their camps several times during the year, while also holding permanent village homes. An observation of these seasonal resorts, without understanding their intention and brief occupation, would multiply by three or four the numbers of every tribe. The utterly confused synonymy of tribes and tribal divisions was a still more potent cause of statistical reduplication. Besides the designated name, sometimes metaphoric and therefore varying, by which members of each tribe called themselves, each tribe of its several Indian neighbors on every side called it by another, which was sometimes a mere term of hatred or obloquy in the language of the aliens. When the tribe or its neighbors were first met by the French, Spaniards, English, or Dutch, every one of the terms first caught by any one of the travelers or traders was naturally accepted as correct, and thereafter was relegated to statistics, probably with blundering pronunciation and arbitrary literation. Instances have been ascertained where the same body of men, now identified, appeared statistically with many repetitions on elaborate tables in which the numbers estimated for each synonym were added together, thereby from this cause alone increasing manifold the officially reported population of the regions discussed.

On the other hand, the story of the rapid fatal extinction is disproved. Many of the accounts are explained by the facts immediately above mentioned, but treated conversely. When a name of a tribe had been adopted, whether correctly or not, and a number of other names of the same tribe had been abandoned or disused, the number of people before reported as belonging to all those disused names was subtracted from the total. So they were considered to be extinct. Doubtless tribes became extinct through their destruction by the European invaders in all parts of the country, especially in Massachusetts and California, but as a general rule the defeated tribes fled to other regions of the continent which were unoccupied and as good for their habitation as those they left, and were not "annihilated," as was the common expression. Even when they infringed upon the regions claimed by a body of Indians occupying them, there was seldom difficulty about the adoption of the weaker by the more powerful and successful folk. The hereditary, traditional, and most hated enemies of tribes were adopted mutually, and this fact, in addition to those before mentioned, explains the disappearance of tribal names as published by imperfectly informed writers. The tribes, as such, did disappear from their old habitat and were not recognized under their former names, but the people did not cease to exist.

So there was neither the immense population nor the horrible extinction on which sentimental stories have been founded, and from which the *feræ naturæ* theory has been deduced. Undoubtedly, since the Columbian discovery there has been a large actual diminution of their numbers from the causes explained above and others not now dwelt upon, such as the importation of strange diseases and the critical effects of enforced sudden transitions in habits; but there was no such enormous decrease as reported, simply because there was no such original population. Many millions of Indians are found in exaggerated stories, but only hundreds of thousands were ever discovered on the ground.

A cause which kept down the Indian population before and when wholly independent of the European invasion has not been adequately considered by most writers on the subject. The Indians had no reasonable or efficacious system of medicine. They believed that diseases were caused by unseen evil beings and by witchcraft, and every cough, every toothache, every headache, every chill, every fever, every boil, in fact, all their ailments, were attributed to that cause. Their so-called medicine practice was a horrible system of sorcery, and to such superstition human

life was sacrificed on an enormous scale. The sufferers were given over to priest-doctors to be tormented, bedeviled, and destroyed. A universal and profound belief in witchcraft also made them suspicious, and led to the killing of all suspected and obnoxious people, and engendered blood feuds on a gigantic scale. It may be safely said that while famine, pestilence, disease, and war have killed many, superstition killed more; in fact, a natural death in a savage's tent is a comparatively rare occurrence, but death by sorcery, maltreatment, and by blood feud arising from a belief in witchcraft is exceedingly common.

Indian Villages and their Distribution.

At the time of the discovery of North America tribes of peoples were found at several points along the Atlantic coast. As explorations continued, from time to time other Indian tribes were found along the rivers, about the lakes, and on the Pacific coast, and such tribes were dispersed over a large part of the continent. No one tribe was very large; some of them were very small. They numbered from two hundred to five hundred persons; a few exceeded this number, and a few were smaller. Though tribes were many, the vast area of the continent was not fully occupied. Sometimes several cognate tribes lived near together, and in such cases they were organized into confederacies. Between the homes of tribes or confederated tribes great spaces of unoccupied territory intervened, so that villages or groups of villages were two or three or even ten days' journey apart. All these tribes were practically sedentary, living in villages which were permanent, with the qualifications before explained, viz., that they were temporarily abandoned at certain seasons of the year, to visit favorite hunting-grounds and fisheries, and to gather the fruits of the forest and prairie, and also that in the lapse of years their sites were shifted.

With some few exceptions the tribes constituting a confederacy and grouped in adjacent villages spoke a common language. Only in rare cases did two or more confederacies speak the same language. In many cases the difference in speech was slight, amounting merely to dialectic variation; in many others the variation was more pronounced, so that while the languages belonged to the same stock or family, the difference was so great that the people of different tribes could not understand one another. Among the many bonds which held a people together in a tribe or confederacy, that of language was one of the most potent.

Every tribe lived in a village, and every village constituted a distinct tribe. In some villages the habitations were scattered, but were so near one another that all the people could be assembled at the sound of the drum. A large communal house for the active clan was common, and in a few cases a great communal house gave shelter to the whole tribe. An essential feature in every village was the *kiva*, or place of assemblage, which was a large chamber or house, together with a plat of ground, upon which the people gathered for a great variety of purposes, as for council, for worship, and for amusement. In some places the house or chamber, often called in current literature the "temple," was a structure made of trees, in the form of a high, conical tent covered with boughs and bark. But there were many other forms of this structure in various parts of the country. In the pueblo region, where the people built of stone, two classes of kivas appear—round chambers and square chambers; and these kivas are wholly or partly under ground and are carefully plastered. A plaza into which the kiva opened was generally found. In the kiva itself only the chiefs and leaders of the council and important persons assembled, and public exercises were usually held in the plaza. In many cases the plaza was arranged with booths on two, three, or four sides, and the sacred council-fire was sometimes kindled in the kiva and sometimes in the plaza, the practice varying among tribes. Some tribes provided only a tribal kiva-but large tribes often had in addition to this a series of clan kivas.

The amount of land taken up as village sites varied considerably in different parts of the country and also in the same tribe at different times. When the people lived in communal houses of sufficient size to accommodate several families, the village consisted of a few large structures closely grouped together, so that it covered very little ground. When territory was occupied by warlike tribes, the construction of rude palisades around the villages and the necessities of defense generally tended to compel the grouping of houses, and the permanent village sites of even the more populous tribes covered only a very small area. In the case of confederated tribes, and in time of peace, the tendency was for one or more families to establish more or less permanent settlements away from the main village, where a livelihood was more readily obtainable. Hence, in territory which had enjoyed a considerable interval of peace the settlements were in the nature of small semi-agricultural communities, established at short distances from one another, and extending in the aggregate

over a considerable extent of country. In the case of populous tribes the villages of the barrier towns, which were next to the country of the tribal enemies, were compactly settled for social defense, according to the general method of savage nations; but the rest were only scattered plantations, as best suits a separate, easy way of living. A stranger might be in the middle of one of their more populous and extensive towns without seeing half a dozen houses in the direct course of his path. More closely grouped settlements are occasionally described—e. g., in the Maumee Valley, in which it was reported that the margins of the Miamis of the Lake and the Au Glaize appeared for a number of miles like one continuous village. Such a chain of villages as this was probably highly exceptional, but even under such circumstances the village sites proper formed but a very small part of the total area occupied. On the whole, it is evident that the amount of land occupied as village sites under any circumstances was inconsiderable.

The size and plan of the villages of the Indians, as above explained, varied greatly, but there was still greater variety in the size, plan, material, and arrangement of their habitations.

Indian Architecture.

As the Indians of North America were and are living in several different stages of culture, their architecture would naturally present a wide range of house structures. Art in architecture normally advanced among them at the same rate as the other arts, yet the conditions under which their architecture has been developed are so complex, and the influence upon it of their widely diverse physical environment has been so great, that it affords no criterion by which to determine the status of the several tribes. The subject is further complicated by the fact that many of the aboriginal types of house structures are now only known in records, and that practically all the remainder have been modified by contact with a superior culture. Many constructive expedients have been adopted and incorporated in more or less modified forms into the aboriginal architecture.

Indian house structures may be divided, according to the material of which they are made, into four groups, viz.: 1. Temporary brush or bark shelters and skin tents. 2. Wooden structures. 3. Earth huts, with a framework of timber, and snow huts. 4. Permanent stone structures. This division is not ethnic, and does not profess to be a perfect classification. Some tribes which

at one time lived in bark huts, afterward used only skin tents; and several which once lived in pueblos, or permanent villages, now build only earth or brush huts. Skin tents are merely variations of brush or grass shelters, and earth huts are often variations of skin tents or brush shelters. The division, though arbitrary, may suffice for description.

1. *Brush or Bark Shelters and Skin Tents.*—There is no evidence that any North American tribe lived in caves except as a temporary expedient, and the most primitive type of house structure found among them is the brush or bark shelter. These are sometimes elaborate—e. g., the well-known "long house" of the Iroquois, which was from fifty to one hundred feet long. Its frame of upright poles was strengthened with horizontal poles attached with withes and surmounted with a triangular or round roof. It was covered with large strips of bark tied to the frame. External frames of poles for the sides and of rafters for the roof held the bark between them, the two frames being tied together. These houses had a passageway through the center, a door at each end, and the interior partitioned off at intervals of about seven feet. In the passageway were a number of fires at regular intervals, used in common by a number of families.

The bark lodge of the eastern Sioux was like the Huron and Iroquois lodges, but was inferior in construction. It had a ridge roof of poles extending from posts, and was covered with bark. The houses of the Hudson River tribes were of long, slender hickory saplings set in the ground in a straight line of two rows, then bent toward one another in an arch and secured together, giving the appearance of a garden arbor. Split poles were then lathed up the sides and roof, and over this bark was lapped on the ends and edges and kept in its place by withes. The Asine made a similar bark hut by planting firmly, in a circle, tall, straight young trees with their tops bent inward and lashed together; great numbers of cross-pieces were then bound on and the frame thickly covered with thatch.

Some tribes whose permanent habitations are of a higher class lived also, at times, in brush shelters or bark huts, usually of the most primitive description, consisting only of a framework of sticks or logs, the sides thatched with brush, and the roof formed by brush laid over a framework and held down by large logs and stones. The Pai-Ute "wickyup" is a structure of the same class, although it is the permanent home of its builders.

The Dakotas built huts or tents of skin by setting up poles

fifteen or more feet high, meeting a little below the top and forming a circle on the ground eight to fifteen feet in diameter. This framework was covered with buffalo-skins, generally tanned, and a hole was left at the top for the egress of smoke. A similar lodge was made by the Comanches, sometimes covered, instead of by skins, with prairie grass thatched over poles. The Blackfeet lodges were of buffalo-skins sewed together after being dressed. The Crows dressed the covering skins almost as white as linen, garnished them with porcupine quills, and painted and adorned them in much variety. The wigwams of the New England tribes were generally built like arbors, of small young trees bent and twisted together, and so covered with mats or bark that they were fairly dry and warm. In another type of lodge, grass and rushes were employed.

The houses of the Sokulks were made of large mats of rushes and were generally square or oblong, varying in length from fifteen to sixty feet, and supported on the inside by poles or forks; the top covered with mats, leaving a space of twelve or fifteen inches the entire length of the house, to admit light and allow smoke to pass through; the roofs were nearly flat, and the house was not divided into apartments. The house of the Chopunnish was built of straw and mats, one hundred and fifty feet long and fifteen feet wide, closed at the ends, and having a number of doors on each side. The interior was without partitions. The Illinois houses were shaped like the arched top of a baggage wagon, and consisted of a framework of poles covered with mats or rushes, closely interwoven. The Tatu huts were of stout willow wickerwork, dome-shaped, and thatched with grass. Sometimes they had sleeping room for thirty or forty people.

2. *Wooden Houses.*—Houses of this type and those of earth are closely related. The Chinook houses were large wooden buildings, varying in length from twenty to sixty feet and from fourteen to twenty feet in width. Two or more posts of split timber were sunk in the ground, above which they rose to fourteen or eighteen feet. They were hollowed at the top to receive the ends of a round beam, stretching from one to the other and forming the upper point of the roof. On each side of this range was another about five feet high, which formed eaves; but as the building was often sunk to the depth of four or five feet, the eaves came very near the surface of the earth; smaller pieces of timber formed rafters, extending in pairs from the lower to the upper beams. On the rafters ranges of small poles were placed horizontally and

secured with strings of cedar bark. The sides were made with a range of wide boards sunk a little distance into the ground, with the upper ends projecting above the poles at the eaves, to which they were secured by a beam passing outside and tied by cedar bark passed through holes made in the board. The roof was covered with a double range of thin boards, except an aperture of two or three feet in the center for the smoke, and the entrance was by a small hole cut out of the boards.

Another type of house was built by the Yurok on the level earth, but generally the builders excavated a round cellar four or five feet deep and twelve or fifteen feet in diameter. Over this they built a square cabin of split poles or puncheons planted erect in the ground and covered with a flattish puncheon roof. The Haida first plant firmly in the ground at each end of the house four posts of sufficient height to bear four beams running from front to back. The heads of the posts are hollowed to receive the horizontal beams, which, like the posts, are circular in section. These beams do not project beyond the posts, and in front of them at each end is a frame composed of large flat beams which support the edge of the roof and the hewn planks of the front. There are generally four flat upright timbers, one in front of each of the main upright posts, which support a pair of beams which have the same slope as the roof, and are channeled below to receive the upper ends of the hewn boards which close the front.

3. *Earth Structures and Snow Huts.*—The simplest type of earth hut was a low, conical framework of logs covered with brush and reeds, and finished with earth, such as the ordinary dwelling house of the Navajo. The floor is usually a foot or so below the ground surface, and at the apex a hole is left for the egress of smoke. The diameter of the hut upon the ground is often fifteen or twenty feet, and the entrance is through a framed doorway about four feet high. Although rude in appearance, these huts are elaborate structures; every piece of timber in the framework is named and must be of a specified size and shape, and the whole is put together with an elaborate ceremonial. Similar structures used by the Mandans were circular, and from forty to sixty feet in diameter; the foundations were prepared by digging about two feet in the ground, and the floor was of earth. The superstructure was formed inside this excavation by a barrier or wall of timbers fixed on end in the ground and resting against the bank. These timbers were eight or nine inches in diameter, about six feet in height, and were supported by a strong embankment of earth on

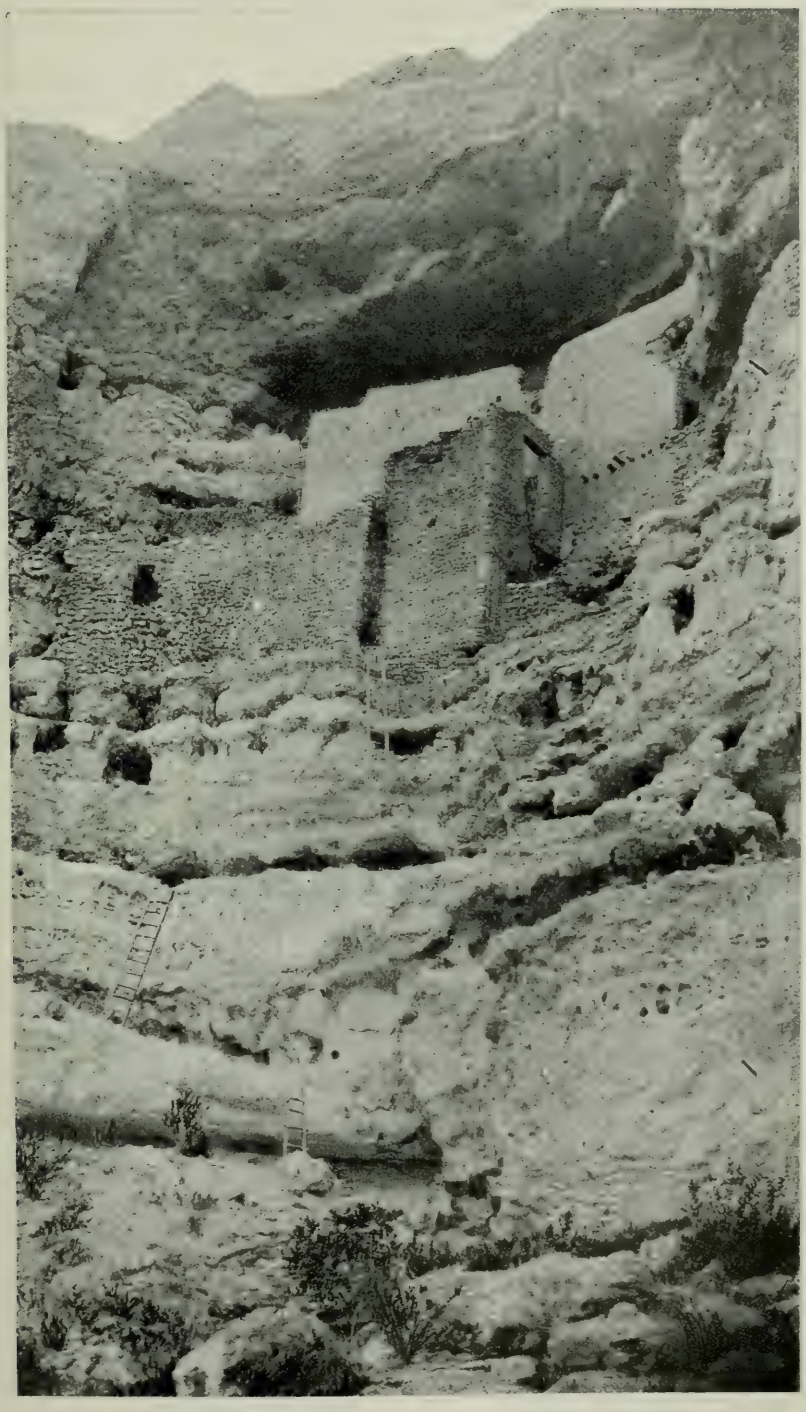
the outside. On the tops of these timbers or piles are others of equal size and number, of twenty or twenty-five feet in length, resting firmly against each other, and sending their upper or smaller ends toward the center and top of the lodge, rising at an angle of about forty-five degrees to the apex. The roof thus formed is upheld by beams passing around the inner part of the lodge and supported by four or five large posts. On the top of and over the poles forming the roof is placed a complete mat of willow boughs half a foot or more thick, which protects the timbers from the dampness of the earth with which the lodge is covered from top to bottom to the depth of two or three feet.

A structure used by the Pomo was an assembly house of peeled pine poles, painted red, black, and white on the inside in spiral stripes reaching from the apex to the ground. Outside it is covered with earth. The pit or cellar which forms a part of it is circular, sixty-three feet in diameter and about six feet deep. The structure is about eighteen feet high in the center, and the roof is supported on five posts, one a center post and four others standing around it, equidistant from it and the perimeter of the pit. Timbers from six to nine inches in diameter are laid from the edge of the pit to the middle posts, and from these to the center pole. Over these are grass and brush, and the whole is heavily weighted with earth. The Innuit ice huts are made with rectangular slabs about three feet by six and a half feet, placed almost upright, resting on their ends and joined so as to form a circular pen about fifteen feet in diameter. Over the top of this the summer seal-skin tent is spread for a roof, being supported by tent-poles held in place by a lashing of seal-skin about a foot below the top of the ice slabs. When two slabs are abutted against each other the edges are trimmed with a snow knife, to give as much bearing surface as possible; and when permanently set, snow dipped in water is applied to the joints inside and out, completely closing all crevices, and when frozen binding the two solidly. The *iglu* is built on a sloping drift of snow, the entrance being at the lowest point. The first trench, from which the snow blocks are cut, is so disposed as to have its axis coincident with the diameter of the iglu which runs up and down hill. The blocks are about a foot and a half wide, from a foot and a half to two or three feet long, and from eight to ten inches thick, and cut so as to form segments of a circle. They are laid in courses, each course inclining inward slightly more than the one below it, until

the last, or key block, is perfectly horizontal and firmly wedges in and binds the whole structure.

4. *Permanent Stone Villages.*—The villages of the Pueblo tribes of New Mexico and Arizona, and the ruins of villages which cover an area extending from Salt Lake City beyond the Gila River and from the Rio Colorado to the Rio Pecos, represent the highest art in architecture attained by the Indians of the United States. Within the area mentioned are thousands of ruins. Until the beginning of the last decade no real investigation of them had been made; travelers and explorers, struck by their immense number, estimated the former population as correspondingly large, some writers even making it one hundred and fifty thousand; and it is hardly surprising, in view of this discrepancy, that the former and the modern inhabitants of this region should be differentiated by many writers. The Pueblo culture is also unique, and the first explorers, who were struck by its apparent dissimilarity with that of other Indian tribes, exaggerated this dissimilarity, some contending that the Pueblos and the plains Indians were altogether different from each other.

The best authorities agree that the former population of the Pueblo region never exceeded thirty thousand. The average population of a village was probably less than three hundred, and a band numbering less than one hundred might in a single generation build and leave in ruins several villages. The process by which this result was accomplished is peculiar to this region. Notwithstanding the apparently permanent character of the stone villages, they were often abandoned for reasons which seem trivial; and prior to the occupation of the country by the United States (1846) the Pueblo tribes were in constant though slow movement, so that, with a few exceptions, no Pueblo tribe to-day occupies the site where it was found by the first Spanish explorers, and some villages have been moved several times in the interim. The causes which produced this movement are many. Superstition was an important factor, and a succession of bad seasons surely resulted in the abandonment of a village; but the main cause was in local changes in the water supply. The Pueblo country is in the heart of the arid region, and during most of the year the streams are represented only by their dry, sandy beds. The minor streams become gradually choked up with sand, and year by year yield a diminishing supply of water, until finally the people in the vicinity find it necessary to move. Once in an indefinite number of years there is an exceptional rainfall,



Cliff-house on Beaver Creek, near Fort Verde, Arizona.

when the stream clears out its channel and the process begins anew. As a result of these physical conditions, there was a constant change of the village sites, leaving in the course of centuries the thousands of ruins which now cover the country. The villages were abandoned gradually, a few families or a few individuals moving at a time; and had the process been allowed to continue without interruption, it would in time have resulted in the destruction of the Pueblo system; but pressure from hostile tribes produced a reaggregation of the scattered families into large clusters, and so the process was intermittent. The removal of the outside pressure consequent on the settlement of the country by civilized immigrants has given a fresh impetus to the disintegration.

The Pueblo architecture is the direct outcome of its peculiar physical environment, and in all its features reflects that environment. The engineering or constructive knowledge of the builders was very limited, and the expedients employed were always simple and often clumsy. For convenience of description the architectural forms may be divided into a number of groups, as follows: *a*, inhabited villages; *b*, village ruins; *c*, cliff and cave dwellings; *d*, cavate lodges.

a. Inhabited Villages.—The essential features of Pueblo architecture are still seen in the inhabited villages. The typical village consists of a number of rectangular rooms arranged in clusters about central courts or in long rows two or three rooms deep. The rooms are generally placed one above another, so as to form one or more terraces. The walls of all the older Pueblos are of stone, carefully selected but not often dressed, and sometimes finished with plaster. Adobes—sun-dried molded brick—have not yet been found in any aboriginal structure, although *pisé*, or rammed-earth construction, was employed in many of the old ruins on the Gila River. Doors and windows were originally but holes left in the wall, and were not framed; the lintels were made of small sticks laid across the top of the opening during construction and incorporated into the wall. There is but one type of roof construction, consisting first of a series of beams, three to eight inches in diameter, laid across the shorter axis of the room, sometimes in pairs, and upon these another layer of small sticks or rushes, crossing transversely the first series, and over these a layer of brush. Finally, the roof was finished by a layer of earth firmly tamped down. The roof of one room is the floor of the room above it, except that when used as a floor the upper surface

is more neatly finished with clay, and in some instances paved with large flagstones. There were no chimneys or staircases, and no door openings in the first story, access to the upper stories being by ladders, and to the first story through trap-doors in the roof. In recent times door openings on the level of the ground are not uncommon, and in many of the Pueblos access to the stories above the first is now by flights of stone steps. Trap-doors in the roof are still in use, however, for purposes of light and ventilation, and sometimes for ingress.

Chimneys, which are a modern addition, are one of the most picturesque features of a Pueblo village. Externally, these chimneys consist of from one to eight round vessels of pottery, with the bottoms knocked out and placed one above another, the joints being plastered with mud. In a corner or along a side wall of the interior there is a fireplace, and over it a hood projecting into the room, usually made of light sticks plastered with mud, resembling somewhat the hood over a blacksmith's forge. There is sometimes a low bench along one side of the room, and in each group of rooms occupied by a family there is one corner or one side always given up to the *metates*, or meal-grinding stones. Along another side or in another corner a long pole is either built into the walls or suspended from the roof, and on this pole the blankets and other articles of clothing are hung. With these exceptions there is no interior furniture.

b. Village Ruins.—The two principal classes of village ruins in the Pueblo region merge into each other. These are villages upon bottom lands, without reference to defense, and villages upon defensive sites. The first type represents the highest attainment in architecture of the village builders, and its best illustration is in the Chaco ruins of northern New Mexico. They are on the flat bottom of a low-walled canyon, and some of them cover an area of three hundred by six hundred feet. The ground plans are sometimes rudely oval, but generally rectangular, and the villages are several tiers of rooms surrounding three sides of a central court or open space, and rising in terraces from the court, so that the outer wall was the highest. The fourth side of the court was closed by a single row of one-storied rooms. The masonry of these ruins consists of a rubble filling or core, and of an interior and exterior facing, sometimes composed of small tablets. The two wall faces are tied together by occasional stones of extra length, which projected from one side into the back of the other, and partition walls are often tied into the main wall in the same way; sometimes they

are made additionally solid by sticks and logs of wood inlaid in the walls. In most of the Chaco ruins the wall faces are finely finished by chinking all the crevices with thin spawls, the whole surface being then rubbed smooth. At a little distance these walls suggest a mosaic. Pueblo architecture is almost entirely utilitarian. At the time of the discovery of the Pueblos, and the consequent arrest of development in architecture, the builders were beginning to abandon the strictly utilitarian basis and to introduce ornament.

Another type belonging to the class situated upon bottom lands without reference to defense is illustrated by the Casa Grande, on the Gila River in Arizona—a ruin more widely known than any other in the United States. The masonry has been described as adobe. It is not adobe, but rammed-earth construction known as *pisé*, and resembling grout. The walls were not laid in courses, but were formed by ramming a puddle of earth in a boxlike mold or receptacle, which was moved along the wall as construction progressed. Each time this was done the height of the wall was increased about three feet.

Ruins upon bottom lands represent the latest stage in the occupation of a given region. Closely allied to them are ruins of the class of villages upon defensive sites. This class comprises by far the largest number of village ruins in the Pueblo region. Villages of this type were smaller than those last described, and were always on high points or tongues of land, easily defended on at least two sides, sometimes on three, and occasionally on four sides, and almost always commanded an outlook over some area of cultivable land, on which the villagers depended for subsistence. There is but one instance known where artificial means were employed to enhance the natural advantages of a site as a means of defense, and this instance probably belongs to a date subsequent to the native insurrection of 1680. In other words, the art of military defense as an element in Pueblo architecture had its birth only at the time of the discovery, if indeed it existed at all.

c. Cliff and Cave Dwellings.—Cliff ruins have been regarded as a separate class of structures, differing in kind or in antiquity from other ruins. Both of these differentiations are unfounded. Cliff dwellings simply arose from a phase of Pueblo life, being a temporary expedient in an exceptional environment. Probably a defensive motive sometimes entered into the construction of these dwellings and determined the selection of the site, though it did not affect the character of the structure. On the other hand,

some of the cliff dwellings were merely outlooks fixed upon in the cliffs, because no other locality gave the same view over the fields which were under cultivation. Cliff dwellings are always associated and were contemporaneous with village ruins. They consist of a number of cells or rectangular chambers built upon a ledge in a cliff, and generally overhung by the cliff. The caves in which they are built are always natural, not at all altered or improved by the builders, and the house structures are exact repetitions of those which compose the small villages on the flat. They are simply small clusters of houses built in natural caves in the cliffs. They do not represent an early stage in the development of Pueblo architecture; all the evidence is to the contrary. They contain all the constructive expedients found in the Pueblos, and often others which were not aboriginal conceptions, and probably were obtained from Spanish monks who lived with the cliff dwellers. Canyon de Chelly, in northeastern Arizona, the best cliff-ruin region in the United States, has been recently examined with instructive results. It was found that while there were hundreds of cliff dwellings in the walls of the canyon, there were upon the canyon bottom many village ruins which are almost obliterated and have been overlooked. Traditions were also obtained from the Tusayan, showing that with one or two exceptions all the various gentes who compose the present Tusayan tribe, and who reached their present habitat at different times, at some time lived and built houses in Canyon de Chelly; therefore the cliff dwellings there are subsequent to the sixteenth century.

With few exceptions the cliff dwellings proper were not regular villages or permanent places of abode, being occupied only during the farming season. One of these exceptions—the most important ruin in the canyon, and perhaps the best-known cliff ruin in the country—is called Casa Blanca, or White House. It was discovered in 1849 by Lieutenant Simpson, and has been often described and illustrated. It consists of a series of cells or rooms in a cove in the cliff about thirty-five feet above the ground, and immediately below a cluster of other rooms forming a village. The circular room in the center of the ground cluster is the kiva, or ceremonial chamber, whose presence always denotes a permanent village, inhabited all the year. The upper and the lower portions of the ruin were at one time connected by tiers of rooms built against the wall and forming a continuous series of terraces.

4. *Cavate Lodges.*—Cavate lodges are but a phase of cliff dwellings due to a peculiar physical environment. Where one is found

the other is absent. They are chambers excavated in soft rock, generally volcanic; sometimes with a walled front, more commonly worked in the mass of rock and entered by a narrow passage. They are always associated with and are generally subordinate to village ruins. The defensive motive exercised so small an influence on the selection of the site that it can be ignored, although some cavate lodges, notably those on the Rio Grande near Santa Clara in New Mexico, are known to have been excavated and occupied on account of their defensive value. The chambers occur usually in clusters of from two to five, and sometimes several clusters are connected with each other in the interior so as to provide a continuous passageway through twelve or more rooms. The interior walls are seldom plastered or otherwise finished, although the floors are sometimes covered with clay so as to afford an even surface. The same general remarks presented concerning cliff ruins can be applied, with slight modifications, to the cavate lodges.

Mexican Architecture.—Several peoples followed one another in their occupation of Mexican territory, each of which successively built and deserted their cities and monuments. As a result, the whole country now presents a rich medley of art remains. The most striking of the remaining features of pre-Columbian culture in Mexico are the ruins of cities, temples, and monuments. The dismantled remnants of a great chain of colossal structures extend from Chihuahua on the north to Honduras on the south—the best preserved examples occurring south of the valley of Mexico. The degree of preservation is, however, not a trustworthy index of the original stability and perfection of the structures, as some were in ruins when the conquerors landed, and others received the brunt of the Spanish devastation, and were totally demolished. Tenochtitlan, Cholula, and Tezcuco—centers of Nahuatl culture and power—were, with the downfall of these peoples, leveled with the ground; while Teotihuacan, Xochicalco, and Mitla, long in ruins, are still magnificent monuments of a vanished culture.

The most striking features of these ruins yet remaining are the pyramids and pyramidal masses of earth, cement, and masonry. This was not so during their occupation, as these massive structures were the nuclei of clusters of ceremonial buildings and of dwellings, all traces of which, as a rule, have disappeared. The largest is that of Cholula, which in its present much altered state measures more than fourteen hundred feet square at the base and nearly two hundred feet in height. They were built in a

great variety of forms, and of such materials as were at hand. They were frequently finished with cement, or faced with neat masonry, and were furnished with terraces and stairways; and the truncated summits were generally occupied by public or religious structures, some of which are partially preserved. In no case were they simply pyramids, serving exclusively as monuments, or as receptacles for the dead, as were the great pyramids of other lands.

The Mexican mural remains present many features of interest, and are often characterized by great massiveness, although never exhibiting pronounced megalithic features. The plan was often complex, and the area covered very large. The masonry was well constructed of cut or of uncut stones laid in mortar. The true arch was unknown, doors and windows being bridged by wooden lintels, by slabs of stone, or by smaller stones overlapping until the span was complete. In some sections grout and sun-dried bricks were also extensively used.

Next to the pyramidal structures, the carvings and sculptures are the most remarkable relics of the ancient culture. Elaborately sculptured columns and slabs and masses of stone of enormous size are found, the Almaraz monolith discovered on the site of San Juan Teotihuacan weighing upward of eighteen tons.

The ancient ruins of northern Mexico are closely allied in most respects to the better-known ruins of New Mexico and Arizona. Cliff ruins are found in the mountains, and deserted pueblos are scattered over the valleys of Chihuahua. The most noted example of the latter class is known as the Casas Grandes, situated in the northwestern part of that State. The principal ruin consists of three or more clusters of rectangular apartments, connected by obscure walls, and occupying an area about two hundred and fifty feet in width by eight hundred feet in length. The walls appear to be composed of cement or grout—a mixture of earth, gravel, and cut straw—which was built up in sections by pouring the plastic material into movable boxes of the thickness of the wall, the boxes being moved along when the contents had properly set. The heavier walls are five feet thick at the base, and still stand to a height approximating two or three stories. Neither the period of occupation nor the people who built these structures is known. The site is said to have been deserted when first visited by the whites. Many less important ruins, mostly reduced to mere heaps of *débris*, are scattered about. Stone, the normal building material, was used in localities where it could readily be obtained.

Five hundred miles farther south, in Zacatecas, are the ruins of Quemada, of which nothing is known as to period or people. The pueblo has been extensive, and was evidently the center of a flourishing community. Its situation resembles that of many of the pueblos of the north, occupying a somewhat precipitous but irregular *mesa*-like elevation from two hundred to five hundred yards wide and half a mile long. It was inclosed, where approach was easy, by heavy walls of masonry. The plan of the pueblo is irregular, conforming to the topography of the site. The walls, terraces, inclosures, columns, temples, and pyramids are substantially constructed of uncut flaglike stones laid in reddish mortar tempered with straw. There are indications of plastering, but no carving or other ornamental work; and no arches, doors, or windows have been noted.

Tula, Tenochtitlan, Tezcuco, San Juan Teotihuacan, Cholula, Xochicalco, and Mitla are other interesting remains, the description of which must be omitted.

It may be generally stated that the art remains of the Nahuan peoples present many close analogies with the antiquities of Central America, but the exact relations in time, genesis, and race have not been determined. The differences are so pronounced that a long period of separation must be assumed upon the hypothesis that all were originally of the same stock. There are also remarkable analogies with the art of Asia, which have suggested to some writers limited cultural relations with that region, or a very remote identity of peoples.

Mounds and Mound Builders.

Many of the tribes of Indians erected mounds, thousands of which, widely scattered over North America, have already been mapped. They were in part domiciliary, houses being built upon them; others were used as sites for kivas. In many of the clusters now found throughout the United States the kiva mound is especially conspicuous. Many of the mounds were used as cemeteries.

Mounds occur most frequently in that part of the United States east of the Rocky Mountains, the area extending from the Gulf of Mexico on the south to the Saskatchewan River on the north, and from the Atlantic coast on the east to the Great Plains on the west. They are found in greatest numbers along the Mississippi River from the mouth of the Wisconsin to the mouth of the Arkansas, in the southern half of Ohio, in Kentucky

and Tennessee, and in Florida, though the remains in the last-named locality are chiefly shell and refuse heaps.

The different types of form may be briefly classified as follows:

A. Tumuli, or mounds in the restricted sense of artificial construction. These are subdivided into (1) conical; (2) pyramidal; (3) effigy, made in imitation of the forms of animals; (4) elongate or wall-like.

B. Refuse and Shell Heaps.

C. Mural Works, consisting of (1) inclosures of various forms, as circles, squares, polygons, and irregular figures; (2) defensive walls, usually thrown across necks of land or built in the rear of or to strengthen declivities; (3) hut-rings.

The conical tumuli vary in size from a slight and scarcely perceptible swell on the surface of the ground to the height of eighty or ninety feet, the majority, however, ranging from three to fifteen feet. They are found isolated and in groups, and there are but few, if any, important groups of mounds in which they do not appear. They are usually composed of earth, yet a few are of stone, which occur most frequently in such mountainous or broken regions as northern Kentucky, West Virginia, and along the eastern border of Tennessee. The large majority of them are depositories of the dead, with which many of the minor articles of art of the people by whom they were built were buried.

The modes of burial in these depositories vary, and, together with the remains of industrial and ornamental art found in them, afford to archæology the best available data for determining the customs, art, and culture-status of the builders and for outlining the several archæologic districts.

The articles found with the human remains consist chiefly of stone implements, such as chipped arrow and spear heads, scrapers and fleshers, polished celts, net sinkers and gorgets, stone axes and hammers and carved pipes, vessels of clay, bone implements, and ornaments of copper. In a few cases the glass beads and other articles showing contact with European civilization are found where their occurrence can not be attributed to intrusive burials.

Pyramidal mounds are peculiar to the central and Southern districts, and are generally large, ranging from nine to forty, sometimes sixty, and even one hundred feet in height. Many Southern mounds of this type have on one or two sides a terrace-like or platformlike extension.

Effigy mounds or tumuli, made to represent animal forms, be-

long geographically to the Northwest section, occurring in greatest numbers in Wisconsin. These and the elongate or wall-like

Head-shaped vase, one half natural size, found with human remains near Pecan Point, Arkansas.

tumuli, which are limited to the same section, furnish no evidence that they were built for burial purposes. They seldom exceed six feet in height, but are found varying in length or expanse from thirty to three hundred feet. The animals most frequently represented are lizards, birds, and quadrupeds; turtle and serpent figures occur in limited numbers. So far as identified, the species represented are those of the modern fauna of that region. The most acceptable theory in regard to the form given to these mounds is that they are totemic.

Refuse and shell heaps are mere accumulations of waste material, interesting to the archæologist on account of the articles found in them, and the evidence which they furnish of former occupation, and of the customs and diet of the ancient occupants.

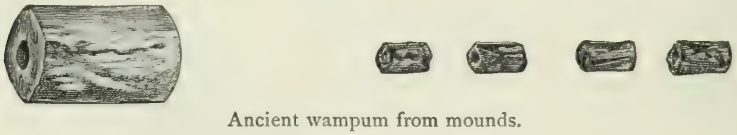
Inclosures are found in all parts of the mound region, though more frequent in New York, Ohio, and Kentucky than elsewhere. They are of various forms, such as circles, squares, octagons, and

irregular figures, and vary in size from those including only a few rods to those embracing over a hundred acres. The works of this class which have excited the greatest interest are the circles, squares, and octagons of Ohio, two or more of these forms being frequently united in a single group. The most extensive work of this kind is that at Newark, Ohio, which covered an area of more than two square miles. It consisted of circles, squares, octagons, numerous lines of parallel walls and other figures, indicating an extensive ancient town, and a state of warfare which necessitated protection against sudden attack.

Another and quite distinct type of inclosures is found in the hill forts, which are usually situated on elevations to which surrounding ravines or bluff declivities give a natural strength. The inclosures of New York and Michigan are generally low walls, frequently in the form of irregular polygons. Those of the Southern States, except a few in southeastern Missouri, are irregular in form, and usually abut on a river or bayou. The walls of these structures are in most cases of earth, though a few in Ohio, West Virginia, and Kentucky are built in part or wholly of stone.

Hut-rings are small earthen circles varying from fifteen to fifty feet in diameter, usually with a basinlike depression in the middle. They are supposed to mark the locations of the circular dwellings of the former inhabitants. The marks of rectangular houses have been discovered in a few of the Arkansas mounds.

The opinion prevailed for a long time among archæologists that the authors of the mounds were of a race that long since became extinct, or moved southward into Mexico and Central



Ancient wampum from mounds.

America, or was absorbed into the conquering Indian tribes. This hypothesis, however, is rapidly yielding to the accumulation of evidence which proves that the mounds are attributable to the Indians inhabiting the mound region at the time of the European discovery, and to their ancestors. The latter view seems to be confirmed by all attainable history, and by the fact that, excepting a few specimens which may readily have been obtained from Mexico or Central America, there is nothing in the works or ves-

tiges of art found in the mounds which is not appropriate to the known Indian culture status and mode of life. Notwithstanding all assertions to the contrary, there is nothing in the monuments or ancient remains of the mound region on which to base a theory that it was at one time inhabited by a highly cultured people. The implements, ornaments, and utensils, taken as a whole, are absolutely undistinguishable by any marked characteristics from similar articles of Indian work in historic times. The indications of tribal divisions, of village life, mode of warfare and defense, all point to a people in the same culture state and having precisely the same customs as the Indians had before contact with the European civilization.

Subsistence of the Indians.

It is customary to speak of the Indian tribes as subsisting by the chase, but this is true only to a limited extent. More than half of them cultivated the soil, and agriculture prevailed on the eastern much more than on the western half of the continent. The agriculture in the humid portions of the United States was in little patches about villages, natural clearings being utilized for the purpose. In the arid regions the cultivated spots were scattered along springs and small streams, the waters of which were used in irrigation.

The Indian dietary was quite extensive. The fact is well known that in America the maize and the potato, two of the most valuable food staples in the world, were widely cultivated. It was only in the extreme North and among the prairie tribes that hunting formed the chief dependence. The Eskimo lived almost exclusively upon the flesh of the seal, walrus, polar bear, and other arctic animals. To this the Alaskan Indians added salmon and the other fish that abound in the rivers of that region. Fish, especially salmon, was also the principal food of all the tribes of the lower Columbia and the west coast region down to about the neighborhood of San Francisco Bay, but they also fed upon various species of berries and edible roots. The tribes of the Sacramento region and the Sierras lived chiefly on acorns and the seeds of the nut-pine and of numerous species of grasses and other plants, which were roasted and eaten in the form of mush and bread, together with grasshoppers roasted or beaten to pulp and made into cakes. The acorns, before being made into bread, were treated by a process which removed the bitter taste. In California, and among other tribes west of the Rocky Mountains,

different varieties of white clay were frequently mixed with the meal of nuts or grasshoppers. In some cases this may have been done to give consistency to the meal, but from its alkaline properties it probably acted also as a seasoning. Everywhere throughout the arid regions, and to a greater or less extent elsewhere, almost every species of reptile and insect was used as food, including even rattlesnakes and larval worms.

Upon the upper Columbia and its branches, together with the Willamette, including the greater portion of Oregon and Idaho, the root of the camas (*Camassia esculenta*) was gathered in great quantities and eaten, either roasted, or, after being reduced to meal, in the form of bread. Throughout all this region the native tribes lived more or less upon game and fish, which were abundant in the mountain lakes, but on account of the scarcity of the larger animals their regular food supply came from the spontaneous vegetal products of the country. None of them cultivated the ground, and many held the doctrine that it was criminal thus to disturb the earth. The Indians of the lower Colorado and the Gila, with all the Pueblo tribes, were agricultural, subsisting chiefly upon corn, beans, sunflower seeds, peas, and several species of squashes. The mesquite bean was also largely used, frequently in combination with corn in the form of succotash. They preserved the fruit of the prickly pear for winter use, and the Pimas also used that of the large *Cereus giganteus*. The mesquite and prickly pear were used likewise by the Apaches and Navajos, the latter of whom for a long period have derived the major part of their subsistence from their flocks of sheep. The Apaches also prepare from the maguey an intoxicating liquor which they call *tizwin*, while they, as well as the Comanches, Kiowas, and other Southern prairie tribes, are addicted to the eating of *mescal*, a species of *mammalaria*, which produces an effect somewhat similar to that of opium.

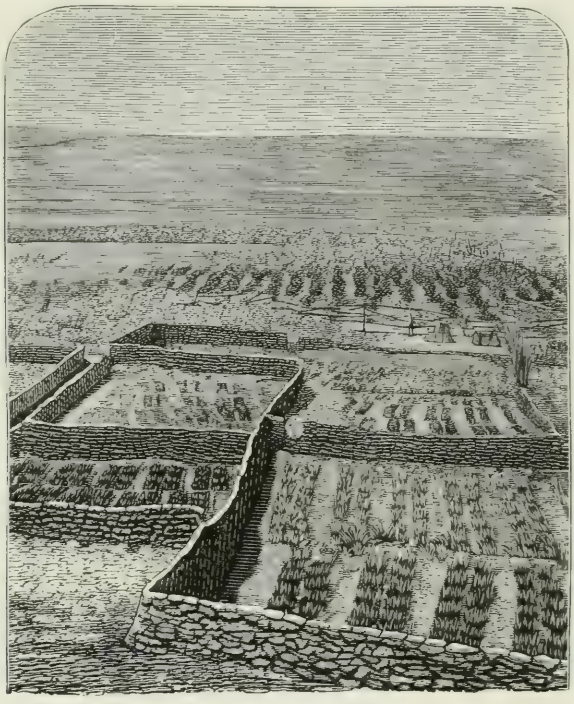
The interior tribes of British America lived almost entirely upon game, birds, and fish, with various wild berries, to which, in seasons of scarcity, they added a soup made by boiling the lichen known to the *voyageurs* as *tripe de roche*. The beaten inner bark of several trees was also used in the same way in this region and about the Great Lakes. The prairie Indians, from the Saskatchewan to the Rio Grande, were pre-eminently bison eaters. This animal, in its uncounted thousands, furnished almost their entire food supply, and its extinction about the year 1870 rendered impossible any further successful resistance to the whites. The

Coahuila Mission Indian grinding seeds.

meat was prepared for use by "jerking"—i. e., cutting it into long strips and drying it in the sun, to be cooked afterward as wanted—or was made into pemmican, a sort of hash of the dried and pounded meat mixed with melted bison tallow. In the form of pemmican it was packed into skin boxes and carried, or was buried in the ground, sometimes for long periods, without injury. The antelope and the domesticated dog were used as food, but as a rule the Indians of the plains ate neither birds of any species nor fish; some of them, as the Kiowas, abstaining from such food for a mythologic reason. The Mandans, Pawnees, and others who had permanent villages on or near the Missouri, cultivated the ground to a limited extent, corn and the seeds of the sunflower being reckoned among their crops. The prairie plum, the choke-cherry, and the root of the *Pomme blanche* (*Psoralea esculenta*) and other bulbous plants, and the petals of the yucca, were also eaten when obtainable. Sunflower seeds were also largely eaten by the Shoshones and others, and some of them knew how to prepare a pleasant drink from the choke-cherry. With these exceptions the prairie tribes were a race of hunters in the fullest sense of the term.

Along the banks of the Mississippi and eastward to the Atlantic, and throughout the whole Gulf region, the tribes, almost without exception, cultivated the ground and depended for subsistence fully as much upon their fields as upon hunting or fishing. About Lake Superior and the heads of the Mississippi, however, where the season was too short to ripen corn, the Ojibwas and others supplied the deficiency from the fish of the lakes, with the cranberries and the wild rice (*Zizania aquatica*) of the swamps. The Menominees derive their name of "wild rice" people from the abundance of that grain in their country. The Hurons and other Northern tribes, like the Western Indians, cultivated sunflowers for their seeds. Throughout the whole region of the Great Lakes and the St. Lawrence, and in the Ohio Valley, large quantities of sugar were obtained from the maple by a process which the whites afterward learned from the natives. As a matter of course, the game of the forest and the fish of the waters were largely used, and were taken by the usual methods. Along the seacoast elaborate weirs were constructed for fish, and dead fish were also used as manure in the fields. Clams and oysters were as much eaten then as now, as is evidenced by the numerous shell-heaps along the coasts. Every edible variety of wild fruit was eaten in various ways, as were also different species of

fungi and lichens. Peaches, melons, and some other fruits and vegetables introduced by the whites were adopted at an early period and were extensively cultivated by the Indians.



Zuñi vegetable gardens.

The honey bee of the European was domesticated by the Indians, and honey from the domestic or the wild swarms soon became an important part of the Indian bill of fare. It is probable that they occasionally obtained honey from the native bee even before the coming of the whites. The Southern tribes used several herbs as greens, and occasionally roasted or boiled the root of the lily, and were not averse to eating the roasted larvæ of wasps and hornets. Numerous varieties of marsh bulbs were also gathered and boiled or roasted, and pleasant drinks were prepared from wild grapes and from the sweet pods of the honey locust. The great food staples, however, east of the Mississippi, especially in the South, were corn, beans, and squashes. Among the Gulf tribes the corn mortar stood in front of every cabin, and every warrior carried a pouch of parched meal to sustain him on his journey. The Cherokees know probably as many ways of

preparing that grain as do any of our civilized cooks. Our names hominy, pone, samp, and succotash are all derived from the Eastern tribes. Many of the tribes cooked their food, and were fond of mixed dishes. Often meats of various kinds, ground maize, and fresh or dried fruits were mixed together in one dish. They all used intoxicants and narcotics, but mainly for ceremonial and religious purposes. Besides the common tobacco many other plants were smoked, though smoking was not an habitual luxury, but only an occasional ceremony.

The Indians of the plains procured salt from surface deposits, and west of the Rocky Mountains the white earth already referred to may to some extent have supplied its place. The Gulf tribes, and perhaps others of the Eastern Indians, never used salt, but seasoned their food with lye instead. In the West and Southwest the wild onion and the pepper known as *chile colorado* are largely used by all the tribes. The Gulf tribes, from Florida to Texas, prepared from the leaves of the *Ilex cassine* a liquor commonly known as "black drink," which was used preliminary to every important ceremonial celebration.

In every tribe certain food *tabus* were found, which usually had their origin in mythology. With regard to cannibalism, more properly styled anthropophagy, that practice, in its correct definition, did not exist north of Mexico. Although human flesh was eaten at times by some tribes, investigation has shown that in almost every instance this was due primarily to some mythologic motive, as a desire to absorb the qualities of a dead hero by partaking of his flesh, or it was a mere passionate act of savage hate and revenge. The eating of human flesh at times of dire famine is not considered in connection with this topic, as it has occurred and still occurs among all peoples.

Domestication of Animals by Indians.

When the Spaniards penetrated into the continents of America, but three beasts of burden were used by the natives. These were the llama and the paco or alpaca of the Peruvian and Chilian mountains, and the dog. The two former were unquestionably descended respectively from the wild guanaco and the vicuna, and they had been systematically bred and selected by the Indians so long as to appear to be specifically distinct from their wild congeners. The primary purpose in their breeding was to obtain their wool, which was used in many fabrics, but secondarily they were employed as beasts of burden; to some extent, also, they

served for food. The llama herds of the Peruvians were extensive, and large numbers of the natives were employed in their care and rearing. Though small, about three feet high at the shoulder, and possessed of no great strength, their agility and surefootedness made them very serviceable to the natives, and their use was continued by the Spaniards in transportation from the mines. About one hundred pounds constituted a load. There is some reason to believe that an animal of the llama tribe inhabited the mountain districts of the southwestern United States and the plateaus of Mexico, and was known to and perhaps domesticated by the Pueblo Indians. Sufficient proof of this, however, has not yet been procured.

The dog appears to have been common to all Indian tribes throughout America. By many tribes it was trained into a more or less effective ally for hunting. By a few, as the Eskimo and the tribes bordering on the Great Plains as far as the southern border, it proved serviceable as a beast of burden, being used sometimes to carry light packs and more frequently for harnessing into the "travois," as the peculiar sleds have been called from the name given by the Canadian *voyageurs*, being a corrupted form of "traineaux." By other tribes dogs were regularly reared to be eaten at feasts of a religious character, and they also served for food in times of scarcity. Dogs' hair was employed by numerous tribes, particularly along the northwest coast, for weaving into blankets and other textures. The Indian dogs, wherever found, were probably descended from wolfish ancestors, and they retained much of the aspect and disposition of their progenitors.

Throughout both North and South America the Indians were in the habit of capturing various species of birds and animals, such as herons, parrots, deer, monkeys, and guinea pigs, and of taming them as pets, but, as a rule, not for economic purposes. Among birds, the turkey was domesticated by the Aztecs of Mexico, and also by some of the Pueblo tribes. To what extent it served for food in the case of the former is uncertain, but to the latter its value was confined to its feathers, which were extensively employed in cloth and mantle making and in religious and ceremonial observances; as also, it may be added, were the feathers of some species of hawks and the golden eagle, which were kept caged and annually plucked.

The semi-domestication by the Indians of wild animals, except the llama and the dog, is of importance only because the habit was preparing them for the next and more important step, viz.,

the thorough domestication and use of some of them as beasts of burden and for food. How thoroughly prepared the Indians were for this step is evidenced by the alacrity with which they welcomed the introduction of the horse, pig, sheep, and domestic fowls. That unaided they would ultimately have domesticated the American bison, can not be doubted; for the bison, though wild and not tractable, could, with proper care and breeding, in a comparatively short time be made serviceable as a draught animal, and also for its milk. It was of immense importance to the Indians in its wild state, but under domestication it would have proved a powerful factor in their march toward civilization. The peccary, or American pig, is of an even wilder nature than the bison, yet it too, in time, might have submitted to domestication.

Indian Technology.

This heading is naturally divided into (1) stone implements, (2) use of metals, (3) pottery, and (4) textile fabrics.

Stone Implements.—There is little positive knowledge of the beginnings of American art in stone. Rude flaked stones have been found in glacial gravels, but the number of specialized forms is so small that types of implements have not yet been established, and all deductions from them as to the art, habits, customs, institutions, and distributions of the peoples are without value. The bulk of the evidence so far obtained from the gravels and other sedimentary deposits is rather against than for the existence of a prevalent rude culture in glacial or immediately postglacial times, a number of widely distributed localities having furnished art remains corresponding closely to the average work of the historic tribes of the same sections. In America, therefore, distinctions between flaked and polished stone implements seem to be of little value in classification or chronology, all peoples and all times producing both classes of work.

The first step in the utilization of stone was to secure a supply of the raw material. In some cases, especially in the earliest periods, this was used in an unshaped condition, and artificial forms were developed by use, through battering, abrasion, and flaking. Stone can not be used without revealing the initiatory steps in the production of both flaked and polished stone. When the surface supply became insufficient, quarrying was resorted to; and thus arose one of the foremost industries of a stone-using people, and one lying at the very foundation of human culture. Quarries of flint, chert, novaculite, quartzite, pipestone, obsidian,

soapstone, mica, etc., from which implements and utensils were made, and of the various massive stones employed in building, are scattered over the continent, and the magnitude of the work in these excavations astonishes the beholder. The stone was shaped by flaking, cutting, pecking, grinding, and polishing; the needs and intelligence of the workmen conspiring with the peculiarities of the material to direct the course of specialization. For projectiles, points were necessarily requisite, and knives and scrapers for dressing game and for preparing the skins for clothing were their natural accompaniment. The same articles served for war and in various arts. They were roughly flaked by direct percussion and finished by indirect percussion, and by pressure. Of the pecked and polished tools, the grooved axe and the celt take first place. Many ornaments, such as gaming and ceremonial stones, belong to this class. Sculptured figures in relief and in the round, all of primitive type, are common within the limits of the United States, but the art of sculpture was more wonderfully developed in Mexico, in the Isthmian states, and in Peru. Carvings and monuments of great size and marvelous complexity of design were realized with much freedom and finish. It is surprising, though certain, that such colossal tasks could have been accomplished with tools of stone.

Use of Metals.—The American tribes were still cramped within the age of stone at the time of the Columbian discovery, but metal was gradually coming into use. Very few tribes were without implements or ornaments of metal, and some of the more advanced peoples had developed great skill in its manipulation. According to early Spanish accounts, Europeans, fresh from the centers of metal-age culture, were filled with admiration on beholding the handiwork of the American goldsmith; and many articles of gold and copper-gold alloy obtained from graves and mounds in Mexico, Central America, and Colombia, give countenance in this particular to the stories of these narrators whose exaggerations in other directions have been detected.

Metal was at first used in the same manner as ordinary stone. Nuggets of gold, bits of silver and copper, crystals of galena, and nodules of iron were found in the sands of rivers or where freshly weathered out of the rocks, and were picked up on account of their color, glistening surface, or peculiar shape, and employed as ornaments and charms. Attempts to change the shapes of these articles in the same manner that ordinary stones were modified, or their accidental modifications due to use, led to the discovery of

the ductile qualities of the native metals, and a new art was discovered fraught with great possibilities for the future. Gold, silver, copper, and their alloys came gradually into common use, and step by step the arts of hammering, swedging, casting, and alloying led up toward the smelting of ores and the utilization of iron, the mastery of which would signalize the opening of a new age.

Copper and gold were the metals most easily and most fully and generally utilized. The art of casting was not practiced to any considerable extent beyond the limits of central Mexico on the north and Peru on the south. In North America copper was obtained mainly from mines on and near the shores of Lake Superior. There masses of the native copper are distributed through the trappean rocks over an extended area, and lumps of this metal from the lake region, transported by glacial ice, are scattered to the south over a vast district. Upon the northern shore of Isle Royale, Lake Superior, there are still to be seen thousands of the ancient mining pits, not yet filled with accumulating *débris*. Excavations made in these pits reveal the story of the past. Great numbers of the stone sledges used in breaking up the rock and freeing the masses of copper are found, and such masses of metal as were too heavy to be removed by the primitive miners still lie in the bottoms of the pits, their projecting points and angles beaten off and carried away. There is no evidence that the copper was made into implements in the quarry. The portable masses were carried away to be distributed by trade, and, at the proper time and place, hammered or swedged into knives, chisels, axes, needles, arrow and spear heads, and ornaments. The processes are not yet fully known; but there is little evidence within the limits of the United States of anything beyond simple hammering.

That the smelting of ores was unknown in America, is confirmed by the fact that although galena—the ore of lead—was in common use by many of the tribes, the metal lead was not known. The discovery of bronze in South America shows that the art of casting was carried to high excellence. Gold and copper and the alloys of these metals were chiefly used for this purpose, and the articles produced were mostly ornaments and trinkets.

The student of art in metal is embarrassed by the difficulty of determining just where pure native work ends and European work or influence begins. The bronze figures of Central America and the sheet-copper articles found in the mound are cases in point. The latter, stamped with elaborate figures of birds and men, are

technically far beyond the range of native American skill. Copper was highly valued by the aborigines, and was a leading article of trade by the first colonists; and it is certain that a considerable percentage of the copper articles obtained from the Indian mounds and graves is of European origin.

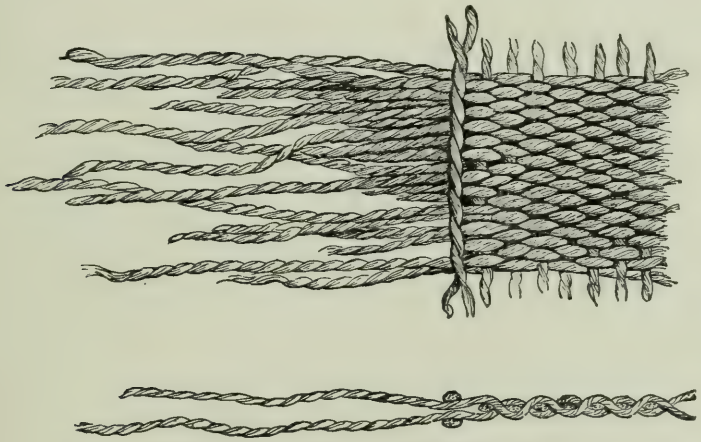
Pottery.—Primarily the art of pottery is devoted to vessel-making, and it is in this field that the highest achievements in American ceramics have been attained. Vases were employed to contain, handle, and transport many substances and articles. In the earlier stages of culture they were confined to these simple uses, but as culture ripened they were devoted to ceremonial and religious offices, and received especial attention at the hands of the decorator, who applied to them symbols, and representations in color and in relief of the deities to whose service they were devoted. With some tribes large vases were used in burial to contain or cover the dead. Pipes, whistles, rattles, toys, beads, calenders, masks, and figurines were made by various peoples.

Native clays of varying degrees of purity were used, and these when properly prepared were tempered with powdered quartz, shell, or like materials. The vessels were usually built by coiling. The wheel was not known, although some simple means for supporting and turning the vessel had been devised. The surface was smoothed by the hands or the modeling implement, or was polished with a stone or other smoothing tool. Much attention was given to surface embellishment. The finger-nails and various pointed tools were used to scarify and indent, and elaborate figures and designs were incised. Stamps with elaborately engraved figures were applied to the soft clay. Impressions made by cords and woven fabrics also gave diversity to the surface. With the more advanced tribes, though these simple processes were still resorted to, engraving, modeling in relief and in the round, and painting in colors were used in the more ambitious pieces. Glazing was unknown, although a high degree of polish was given by a number of processes; and in one group of ware, represented by several pieces from Mexico, the effect of burnished metal is successfully imitated. Baking was done in the open air, or in furnaces of very simple construction, and the heat was seldom so intense as to produce even a slight degree of vitrifaction.

The range of culture covered by this art is considerable. Between the groups of products belonging to the lowest tribes scattered over the continent there are many and long steps of progress. Near the upper limit of achievement are the fine wares of Mexico,

comprising a wonderful cluster of well-marked groups. Some of the best examples of this art are found in the valley of Mexico; and one superb vase, said to have been obtained on the site of the ancient city of San Juan Teotiguacan, and now in the Museo Nacional, stands forth as a masterpiece of American fictile art. Ancient Pueblo work, all things considered, stands first within the area of the United States. Closely approaching this, however, are the attractive and greatly diversified wares of the Mississippi Valley and the Gulf coast.

Textile Fabrics.—Woven fabrics include all those products of art in which the elementary parts employed in construction are more or less filamental, and are combined by methods determined



Fabric from a mound near Davenport, Iowa.

chiefly by their flexibility. The processes employed are known by such terms as wattling, interlacing, plaiting, netting, weaving, sewing, and embroidery. The materials most used by the more primitive peoples were pliable vegetal growths, such as twigs, leaves, roots, canes, rushes, and grasses, and the hair, quills, feathers, and tendons of animals. The more advanced nations had learned to prepare and use many additional filiform and fibrous elements, including bast, hemp, cotton, and wool.

Unlike works in stone and clay, ancient textile articles are seldom preserved to our day. Still, from historic accounts, and from a study of the many varied and beautiful articles produced by modern tribes, fair knowledge of the range and general character of native fabrics can be obtained. In many cases woven textures buried in caves have been preserved by the impregnation of the

sands by preservative salts; and frequently bits of fabric wrapped about copper tools, utensils, or ornaments in burial retain a perfectly fresh appearance. Charring has also been a means of preserving cloth, and much has been learned of the weaving of vanished tribes through impressions upon pottery made by applying the texture while the clay was still soft. Wattlework composed of rods, branches, and vines was employed in constructing inclosures, fish-weirs, cages, and the like. Matting made of rushes, split canes, and twisted strands, often of great beauty and technical perfection, was in almost universal use for carpets, seats, hangings, bedding, shelter, and the covering of houses.

Of pliable fabrics there was a great variety. The weaving appliances were everywhere very simple, but the results in plain and figured textures, in tapestry, in lacelike embroideries, and in featherwork reached by the more advanced peoples challenge the admiration of the world.

Indian Costumes and Adornments.

When the Indians clothed themselves it was chiefly for ornament. They were habitually almost naked; a loin-cloth was everywhere used, however, and only children were entirely nude. But in cold weather they protected themselves with furs and the tanned skins of animals, and by garments woven of animal and vegetal fibers. Except in very cold weather, however, such garments were used only for adornment, but at all the kiva gatherings, for council, for worship, or for amusement, they decked themselves fantastically and piled garment on garment.

The variety and quantity of the Indians' clothing depended largely upon their habitat and environment. Clothing may be divided into two general classes, ordinary and ceremonial. The ordinary wearing apparel of the Alaskan and other boreal tribes consists of shirts or tunics and leggings and boots made of skin with the hair attached. The skins of the several species of seal, otter, deer, and marmot are generally employed. Frequently suits are made of the intestines of the seal, which are worn over the ordinary dress as a waterproof garment while hunting and fishing by boat. The Athapascans of British America resort to the general use of fur and buckskin clothing. The Chippewayan ("Pointed-shirt people") are so named on account of their long, shirtlike garments terminating below, both front and back, in a sharp point. Some of the tribes of Nevada and California wore garments of rabbit-skin as well as of buckskin, though less cloth-

Navajo woman weaving a blanket.

ing was worn by them than by their northern neighbors. Among the tribes of the Colorado River in Arizona the women made and wore serviceable skirts of the inner bark of the cottonwood and other indigenous trees. The bottom ends of the strips of bark, reaching below the knees, were often split to resemble fringe. Many of the tribes inhabiting the country between the Rocky Mountains and the Sierra Nevada when first known wore only the simplest form of apparel. The women wore a simple covering reaching over one shoulder and secured under the arm of the opposite side, reaching as far down as the hips. In addition to this was a short skirt fastened to the waist by means of a belt or girdle. The garments of the men resembled an inverted sack or bag, having an opening to permit of the insertion of the head, while the corners were cut off, thus leaving holes for the passage of the arms. Sometimes short sleeves were added. This, together with the loin-cloth, and sometimes a pair of moccasins, completed the entire dress.

One of the first changes in the costumes of the Indians, made after coming in contact with civilization, was the lengthening of the women's skirts. Such clothing, as well as small robes and larger ones to serve as bed-covering, was often made of a warp consisting of some ligneous fiber, with a woof formed of strips of rabbit-skin wound spirally round a fibrous cord, the two being then woven together by stretching the warp upon the ground and carefully working in the woof. The Mojave women frequently insert under the back of the skirt a roll of soft bark, to form a sort of bustle for a seat upon which the babe is placed astride when the mother has any considerable distance to travel. The New Mexican and Arizona Pueblo tribes made excellent woolen and cotton skirts, tunics, belts, and other articles of clothing. The fur of rabbits and hares was also spun into fiber for cloth. Cotton sandals, and some made from the fiber of the yucca, have been found among the effects of the occupants of the now deserted ruins and cliff-houses. Some of the Arizona tribes used sandals of rawhide secured to the feet with thongs. The Mescalero Apaches have moccasins with a peculiarly turned-up toe, thus guarding the toes of the wearer against forcible contact with stones and rocks.

The Mexican Indians indulged in more elaborate clothing, consisting of cotton and other fibers. Mantles and other forms of apparel also appear to have been in use, while feather robes were not uncommon. These, however, were ceremonial, and in-

dicative of rank. Ceremonial clothing usually bears evidence of elaborate decoration in beads, porcupine quills, claws and teeth of animals, shells, and feathers. Many of these garments are further ornamented with paintings of a totemic or religious character, or bear the insignia of the wearer's rank and social status. Metal ornaments, such as armlets, bracelets, anklets, earrings, bells, etc., were also worn, the material and quantity being in accordance with the wearer's ability and pecuniary condition.

Upon both social and ceremonial occasions many of the Indian tribes wore elaborate head gear, consisting of eagle feathers and the plumes of other species of birds, tufts of hair dyed in red or other colors, and bird skins and pelts. Necklaces of claws, shells, deer and antelope hoofs, the teeth of various animals, snake skins, and even human fingers, are brought into requisition. Labrets or lip ornaments of walrus ivory and bone are used by the natives of Alaska. The first one inserted is generally small, but as the tissues become stretched and the orifice enlarged the size of the labret is proportionately increased. Earrings of brass and copper wire are used by most Indians, sometimes the entire edge of the cartilage of the ear being perforated for this purpose. Silver bracelets, rings, and other ornaments are now extensively manufactured by the Haida, Chilcat, and Navajo. By some of the tribes of the Great Lakes bags made of beads and secured by a broad baldric were worn in religious dances. The use of bells as rattles appears to be a survival of the employment of deer-hoofs or shells, the ready acquisition of the former having no doubt caused their adoption.

Tattooing and Painting.—Evidences of the practice of tattooing are found among the greater number of Indian tribes. By far the most elaborate and artistic work was among the Haida, who thus decorated with religious and mythologic figures the breast, back, forearms, and legs. These characters were usually produced by using black pigments, though after vermilion was obtainable it was sometimes employed for certain parts of figures with symbolic significance, or to accentuate particular and important ideas connected with the design. The operation of tattooing was performed, at the time of a ceremonial festival, by tracing the outlines with a paste of soot, powdered charcoal, or gunpowder, by means of a stick or a small brush made by chewing the end of a twig. The colored part was then pricked with sharp spicules of bone, fish-spines, and later by a small bunch of needles. The operation was painful and tedious, and could not be completed at

one festival or "potlatch." Violent inflammation sometimes resulted, causing ulceration, whereby the color design was obliterated, leaving only the same line more blanched than the ordinary surface of the person. After the black pigment became finally deposited under the cuticle, the naturally yellow or light-brown tint of the Indian's skin caused it to appear of a bluish or greenish shade. Tattooing was practiced to a limited extent among some of the California tribes. Among several of the northern Pacific tribes spots were tattooed upon the forehead of the women, by which means they might be identified if captured by the enemy, and exchanged or ransomed. Occasionally, short transverse lines were tattooed at intervals upon the inner surface of the forearm by which the length of strings of beads was measured in barter. Among many of the Northern prairie and lake Indians the shamans of both sexes practiced tattooing over a painful or diseased spot to expel the demon which was supposed to have caused the distress. The Indians of Virginia are reported as having tattooed upon their person various designs to indicate rank and social status, such marks consisting of arrows, crosses, and parallel lines.

Painting was common to all the Indians, and no one was considered as completely dressed until pigments had been applied in a style sometimes to suit the fancy of the wearer, and sometimes in accordance with tribal conventions. The pigments, before they could be procured at trading posts, consisted of ochres of red and yellow tints, powdered charcoal and soot, white clay and infusorial earths, blood, resin or pitch, and the juice of roots, fruits, and plants. Grease and red ochre were applied by many tribes of the warmer areas to prevent the burning effects of the sun and the annoyance of insects; the same method was also pursued by some of the Northern tribes to guard against the chapping of the skin from great cold. Mourning customs demanded, as a rule, the application of colors, frequently black, which among some California tribes consisted in covering the face with soot and pitch. Sometimes the length of the period of mourning and abstinence from ordinary habits was determined by the time during which any of the mourning pigment remained visible. Many tribes had special styles of painting the face when going to war. Most of the Northern tribes colored the entire face red, or perhaps only the forehead, while others painted only one half of the face, leaving the other side plain or covered with some other color. Indians, as a general rule, applied red coloring matter to

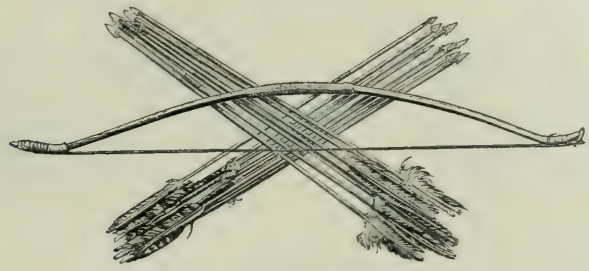
the line exposed by parting the hair; and the women and girls frequently colored the cheeks red to enhance their beauty. Among the Ojibwa shamans specific lines and spots of color were applied to the face to indicate their rank in the cult societies, so that the status of the individual might be known at a glance. Among the Mandans, Hidatsa, and Arikara, designs of various kinds were employed to note the performance of personal exploits, and during ceremonial observances such designs were exhibited, painted upon the limbs and body as well as upon articles of clothing worn by the person entitled to bear them. Among the Crow Indians red pigments were applied to small balls of resin attached to the braids of hair, thus becoming durable ornaments as well as permanently holding the strands of hair in place. Many instances of scarification have been discovered, the most important being that practiced by the Cheyenne Indians, who, when successful in war, cut gashes across the forearms as a kind of sacrifice.

Indian Art of War.

A description of the art of war known to the North American Indians would naturally set forth their devices for offense and for defense. Their striking weapons were maces and clubs with stone heads, and also a kind of flail or slung shot. The sling was also known in several places. Many of their clubs were armed with jagged teeth of stone. Their slashing weapons were leaf-shaped daggers with handles of wood or rawhide. A savage battle-axe was fashioned by inserting sharp chips of obsidian or jasper along a handle of wood. Every warrior carried in his belt a stone scalping knife. Piercing weapons were javelins, lances, and arrows.

The javelin was not a common weapon within the United States, but was in frequent use in Mexico and along the west coast as far as Alaska and thence across to Greenland and Labrador. It was hurled with great force by means of the *atlatl* or "throwing stick." The spear or lance was a hastate or lanceolate blade of hard stone, chipped or ground, and inserted at the end of a shaft from three to ten feet long. But the most ingenious and the most common piercing weapon was the arrow, made of driftwood and walrus ivory in the North, of hard wood in the middle region, and of cane and hard wood in the South. Everywhere the materials best adapted for the arrow had been carefully sought for in the productions of each region. With point of obsidian, jasper, or chalcedony, fore shaft of hard wood, shaft of

willow or rhus or cane, feather from the wing of the eagle, this aboriginal weapon contended against bullets down to the middle of the nineteenth century. It was discharged by means of the bow, which in some places was made of a single piece of hickory

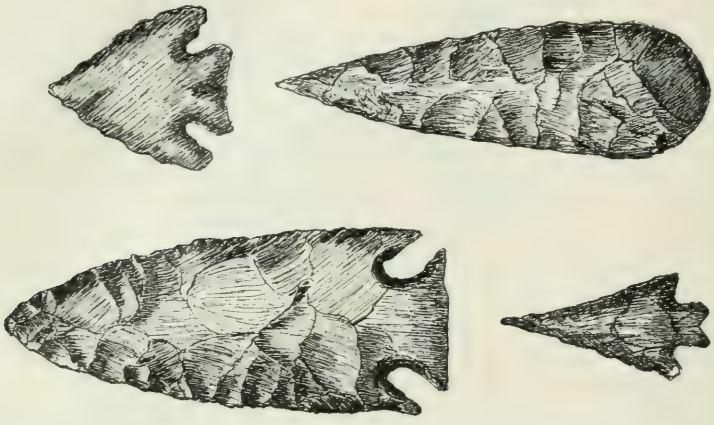


Indian bow and arrows.

or ash or other wood of similar elasticity and toughness. In the extreme North, where appropriate wood did not grow, the bow was made of driftwood, strengthened by a cable of sinew cord, applied to the back in such manner as to convert a breaking into a columnar strain. Along the Pacific slope and in the interior basin a backing of shredded sinew was so ingeniously laid on the bow with animal glue as to imitate the bark of the wood. In the plains of the Great West a compound bow was fabricated of buffalo-horn.

The Indians used the shield to parry rather than as a stationary defense. It was made of rawhide, was extremely light, and therefore could be handled with great dexterity. In the South, armor was made of closely woven cotton or other fiber; in the North, of rods or slats joined together by a weft of sinew or other cord, and of the hide of the male elk or moose or buffalo in the regions where those animals abounded. The American savages had no engines of war designed to be handled by more than one person, but they used fire with great effect. Their fortifications were ramparts surmounted either with stockades or simple earthworks, frequently with the ditch inside. Signals made by fires and smoke and other primitive devices, such as marks and drawings on trees and rocks, and sticks of wood crossed and inclined according to previous understanding, conveyed information concerning the movements of war parties. There were no troops, in the accurate sense, and the only military tactics were those depending upon surprise. In the dead stillness of the night the band of warriors with noiseless tramp, or in the canoes propelled by silent paddles,

stole upon their victims and killed them without mercy, or skulked in ambush with the same result. Captives were sometimes adopted into the victorious tribe or clan, at other times reserved to grace the triumph of the conquerors; but they were usually slain, and their scalps reserved as trophies of victory. Sometimes war



Common forms of arrow points from New Jersey.

was declared formally, and at its close treaties were made and recorded, not with pen and ink, but by wampum belts or other mnemonic witnesses of the transaction. In these proceedings embassies were common and diplomatic skill was often exhibited.

Indian Modes of Transportation.

In North America the conveyance of persons and effects by land and by water was by a number of ingenious devices. In the absence of wheeled vehicles transportation by land during summer and in the Southern regions was on the backs of men and women. The dog lent a meager aid as a pack animal, carrying in that manner about fifty pounds, or along the Northern parts of the United States was hitched to the *travois*, by which he could transport loads of twice that weight. In winter, sledges drawn by dogs and men were used wherever the opportunity offered. But the men and women were the primitive bearers of burdens. The first passenger train on the continent was a procession of Indian women, with their children strapped on their backs in cradle boards. The earliest freight train was a company of men and women each with a hundred pounds or more borne on the back and shoulders and held in place by a multitude of devices—carry-

ing-straps, frames, baskets, or wallets—differing with the region and with the tribe. Also, when the canoe was used it was supplemented by the carrier. Between the navigable portions of different bodies of water were necks of land called portages, across which the canoe and all its freight must be carried. The occurrence of minerals and strange objects in the hands of tribes many hundreds of miles away from the natural source of those articles indicates that active commerce which required transportation was in operation when the continent was discovered by Europeans. It may be remarked, however, that much of the exchange was in the form of gift, little by professed barter.

So far as practicable, transportation among the aborigines was carried on by water. The absence of domestic beasts of burden was compensated by abundance of waterways over which the Indian craft glided. In the far North, skins of seals specially pre-

Eskimo kaiak.

pared were drawn over frames of driftwood or whalebone to make a *kaiak* for the hunter or the open *umiak* for the women and the luggage. On the Missouri River the hide of a buffalo bull stretched over a crate formed of slender poles supplied a tub-shaped craft called "bull boat." Throughout Canada and inland Alaska, as well as along the northern boundary of the United States, birch bark took the place of skin, and, as these delicate shells never ventured far to sea, they were always made as open and light as possible. In the United States generally, and along the Pacific coast, the dugout or the pirogue was the water craft; and it is a most interesting study to trace the manner in which both the material and the form of these diversified conveyances were influenced by the region in which they were used. The canoe or kaiak or pirogue was propelled by means of paddles, never by oars. No canals were dug, but along the level reaches of inland waters boats were dragged up streams by means of long lines of rawhide. From the above it appears that transportation was in the most primitive condition in America at the time of its discovery.

Indian Amusements.

It has before been explained that Indian sociology did not allow a full title to real or even to personal property. It would therefore be inferred that the Indian was not acquisitive, and would not see any advantage in further labor when his immediate wants had been supplied. Hunting and war really occupied but a small portion of his time, and left abundant leisure for such amusements as he could invent, the opportunity for which was improved to the utmost. His home life was a constant round of dancing, feasting, gaming, and special attendance on and participation in religious ceremonies, which thus had the character of social reunions and tribal holidays.

Besides the religious dances, such as the green-corn dance of the Eastern tribes, and the medicine dance, snake dance, and more recent ghost dance of the Western tribes, with the war dance, scalp dance, and other ceremonial dances, there were a large number of dances whose only purpose was that of social pleasure. Some, usually those of particular societies, were performed by men alone, others by women alone, and others again by both sexes together. Night was the time usually selected, and various musical instruments were used to guide the dance and to accompany the chants. Some of the dances had no special significance, others were of a pantomimic or dramatic character. Among the latter may be mentioned the pigeon dance of the Cherokees, in which a circle of dancers representing a flock of pigeons is attacked and dispersed by a single performer who personates a hawk. The favorite dramatic performance among the prairie tribes is the Omaha dance, a pantomimic rendering of an attack upon a hostile camp, represented by a kettle of dog soup in the center of the lodge.

The games of the Eskimo are chiefly athletic, consisting of racing, tossing up in a walrus-skin, throwing of stones or other weights, and wrestling. The opportunities afforded by the long nights of the arctic region make them inveterate story-tellers, and the skill which they display in the carving of elaborate and often comic designs on bone and ivory proves that they find in this work one of their chief sources of amusement.

The ball game was common to all the Eastern tribes from Hudson Bay to the Gulf of Mexico, and was found also among the Sioux and other Northwestern tribes, as well as among some on the Pacific coast. The Canadian "la crosse" and the Louisi-

ana "raquette" are simply civilized adaptations of this Indian game, which was played in the North with one racket and in the South with two. The ball-play dance, which was one of the most picturesque of those performed among the Southern tribes, was accompanied and preceded by fasting and other religious ceremonies. Among some tribes also the players were subjected to the ordeal of scratching or gashing on the naked skin before the application of the sacred "medicine" or charm. Athletic young men were trained up for the ball play, which was frequently an intertribal contest, and it was by using their game as a stratagem that the allied tribes were able to surprise the garrison of Mackinaw in 1767. In this and in almost every other Indian game betting was an important feature, and contestants would sometimes stake all their effects on the result.

Another game, which in various forms was found among probably all tribes, was that known as the "snow snake" among the Iroquois, as *katayûsti* among the Cherokees, and as *chûnki* among the Creeks. As usually played in the East, the game consisted of rolling forward a stone disk or wheel and sliding after it a stick curved at one end in such a manner that the wheel, when it fell to the ground, would rest within the curve or crook of the stick. The antiquity of this game is proved by the great number of these stone disks found in the mounds. Somewhat similar in character are the wheel games of the prairie tribes, in which the contesting players throw slender sticks at a wheel covered with a network of rawhide to see who can come nearest to the hole in the center. The Arapahoes have another wheel game, in which a pair of sticks fastened together near one end are thrown so as to strike the wheel at certain figures marked on the circumference. Among the prairie tribes a game was played with bones shaped to a point and feathered like a dart, for sliding along the ice of the frozen streams.

The throwing of arrows, either at a target or without aim, simply as a contest as to the farthest distance to which the cast can be made, was a favorite amusement among boys and young men. Special arrows of large size and highly ornamented are sometimes made for this purpose. Throwing or shooting at a target with tomahawk, knife, bow and arrow, and later with gun or pistol, was much practiced. Racing on foot was also general. Among the equestrian tribes of the prairie horse racing is yet indulged in almost every afternoon through the warm season, and intertribal matches are of frequent occurrence. In the Southwest the boys

had a peculiar kind of kicking race, in which the contestants, running in parallel lines, kicked or threw small pieces of wood with the toes, sometimes keeping up the race for miles at a time.

There were numerous gambling games, played with bones marked in various patterns, or with sticks or reeds cut and painted with diverse designs. In most of these games success was obtained by chance more than by skill. Perhaps the most entertaining of all the Indian games are those of the "hunt-the-button" variety, in which the players, having chosen sides, sit in a circle upon the ground, and those of the one side pass some small object, as a bead or a cartridge, from hand to hand, while their opponents facing them endeavor to guess where it is. The movements of the hands, in front and back, and over the head, are made in time to a peculiar rhythmic song, broken by sharp ejaculations as one player or another calls out the hiding place of the concealed object. These games are usually played in the long winter nights, and a circle of wild Kiowas or Comanches, in paint and buckskin, seated around the sides of the *tipi*, with the fire blazing brightly in the center and lighting up their animated faces as they swing their hands in time with the rhythmic chant, is one of the most picturesque scenes in savage life. The Kiowas, and probably other tribes, have also sacred games for divination and other purposes, the gaming implements being held in the keeping of a shaman, and only produced by him for use after the payment of a fee.

With the exception of the "hunt-the-button" games, which are common to both sexes, all those thus far enumerated are played by men. The women have a game similar to the "shinny" of white boys, and a football game, in which the object is to keep the ball in the air as long as possible by kicking it from below with the toes. They also have several games of dice, played with plum-stones or pieces of bones marked in a distinctive manner, which are tossed up from a bowl or shallow basket. These games are common to the women of all the prairie tribes, and were also formerly known in the East.

Among the Sioux and other Northern tribes the women play what is sometimes known as the "deer-foot" game. In this, a number of cylindrical bones, usually taken from the foot of the deer, and perforated with several holes around their sides, are strung upon a cord, which has at one end several strands of beads and at the other a long needle. The object is to toss the string, with the beads upon it, in such a way as to catch upon the point of the

needle, which is retained in the hand, any designated one of the bones or bead strands.

The favorite game among the women of the Kiowa and other Southern tribes is the "awl game," in which the players sit upon the ground around a blanket, in the center of which is placed a stone, upon which each in turn throws down a bundle of four sticks flat upon one side and round on the other, and marked in a peculiar manner, one of them being the trump or winning stick. Points are scored according to the sides which turn up or down, and each player keeps her tally by sticking an awl into the blanket at certain lines or dots marked in charcoal around the border. There are a number of details about the game which render it especially interesting and amusing, so that a group of women will frequently spend a whole summer afternoon in the play, until darkness compels them to stop.

Among the boys, shooting with the bow, walking upon stilts, throwing stones from slings, and spinning tops, either with the fingers or by means of a whip, are the common amusements. The girls, like other little girls the world over, play "house" with their dolls, which with them are of buckskin, and dressed and ornamented like full-grown Indian men or women, and are carried on sticks or in miniature cradles. The Zuñi girls have a game in which a feathered shuttlecock is tossed from the hand, very much as the football is tossed by the girls among the prairie tribes. They have also their footballs, and throwing-sticks tipped with buffalo horn, and are fond of making pets of the puppies so numerous about every Indian camp. For other toys, boys and girls have miniature copies of every variety of weapon or household utensil used by their parents, and, like other children, find amusement in imitating the ways of their elders.

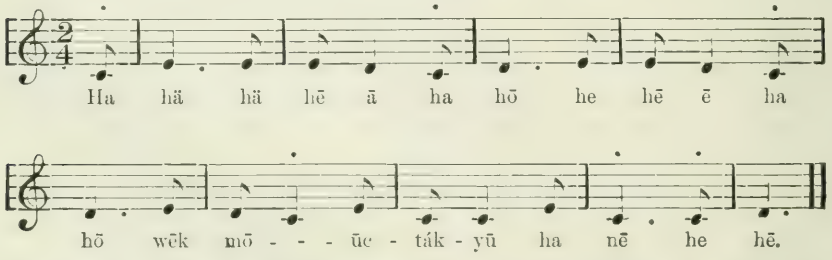
Indian Music.

The North American aboriginal music was in the main simply rhythmic, yet many tribes had the beginnings of rude melody in songs. Their instrumental music was wholly rhythmic. It is an interesting fact that very many tribes speedily appreciated and adopted the more simple of the Aryan melodies which they heard from the European settlers. It is now not uncommon to find two classes of songs among the tribes, their more progressive members advocating the adoption of civilization and singing the songs of civilization, while the more conservative remain as pagans, clinging to their ancient laws and customs, worshiping their ancient

gods with primitive rites, and reiterating their primeval chants. Their ritualistic chants and songs are uttered in recitative, and recount the traditions of the aboriginal cosmogony, the exploits of deities, and their beneficence to the Indian. Among the tribes chants abound which form portions of initiatory ceremonies of cult societies, songs used by one or more shamans in incantation and exorcism, chants or songs used in administering cult-medicine to the sick and as invocations to the superior beings. Martial songs are of many kinds, such as are sung previous to departure from camp, in which are recorded the brave deeds of the tribe or its individual warriors; and such, again, as are chanted in recounting the exploits performed after a successful campaign. There are a great variety of chants which are accompaniments to scalp dances.

Social songs frequently appear to be sung for mere amusement, but there is always more or less evidence of a ceremonial origin, in which one person or party was pitted against a corresponding opposing side, thus typifying some elements or deities, each of which was striving to outdo the other. Although the primitive conception may be lost sight of, the fact remains that rivalry exists, and all efforts in cleverness of dancing and singing are brought forward to gain from the spectators their approbation and admiration.

Love songs, employed by the Indian lover near the habitation of the girl of his choice, also belong to this class. Sometimes the



youth will vary his course by using a small whistle of bone or a flute of cane. The mother's lullaby to her child, though soothing and plaintive, frequently partakes of an invocative nature.

All games of chance and skill have chants as their appropriate accompaniment.

Under the designation of mortuary songs may be embraced the typical death song of a captive warrior sung shortly before his immolation, the lamentations of bereaved women, and the

eulogistic chants voiced by travelers who pass the last resting-place of a deceased relative or friend, or that of a noted warrior of their own tribe. The above is a good example of Indian music; it is sung by the Tsa'yek society of the Nootka.

The emotions are expressed in musical rendering of chants and songs, which are usually said to be in a minor scale; but, in fact, the scale is not usually very well defined, and varies more or less from tribe to tribe, the notes and intervals being altogether different from the Aryan scale.

Martial and social songs are usually uttered in quick time, and are frequently very inspiring, while the recitative chants and songs of the shamans often consist of monotonous, rhythmic repetitions of simple words and short phrases, to which may be added meaningless syllables to prolong the musical tones. Such songs are repeated in direct proportion to the degree of inspiration which the singer imagines or professes himself to have attained.

The chief musical instruments consisted of instruments of percussion, though short bone whistles and wooden tubes having reed pieces were used as game calls. Tambourines beaten as drums, and rattles, were also employed. The largest form of drum, varying from fifteen to twenty-four inches in diameter, by about half that diameter in depth, was used in the ordinary dances, but not in those of a religious character. There may be from two to six drummers. The drumsticks are sticks two feet long, to the end of which is secured some buckskin, or similar substance, to form a ball or hard mass, which is struck upon the rawhide or buckskin drum-head.

Another instrument, played upon by many of the Western and Pacific coast tribes, is made by placing over a depression in the earth, or over a hollow tree stump, a frame of wood or even wickerwork, over which a covering of thin wood, or more generally a stretched skin, was laid. The performer, kneeling before this drum, would place upon it one end of a notched stick, the other end resting against his breast, and then would rapidly pass over the notches another and shorter stick. By varying the rapidity of the movement a variety of rumbling sounds would be produced. The Pueblo tribes, also, sometimes produce harsh grating sounds by rubbing notched sticks upon the edge of a large piece of gourd, which edge is protected from fracture by attaching a thin slab of wood. This is used to accompany dancing music.

Tambourines averaging one foot in diameter, and made of a wooden hoop covered with skin or rawhide, are struck with a shorter drumstick. These are used by exorcists, and by the drummer attending a gambling party.

Drums used by shamans are generally made of a hollow piece of wood, such as a portion of the trunk or a large limb of a tree, having a rawhide or buckskin covering at the top, with a rawhide or wooden bottom. The top is usually wetted and stretched by means of a hoop, and water is poured into the instrument to increase the elasticity of the interior. The drumstick used with this form of drum is of hard wood, the end being curved downward to resemble a curved finger. The sound emitted is a dull thud, but may be heard at a distance of from one to two miles.

Rattles are of many forms, and are made of a variety of substances, such as rawhide, wood, and dried gourds, tortoise shells, and clusters of deers' hoofs. They are generally used in connection with drums to accentuate certain portions of the songs, though shamans frequently use the rattle only as an accompaniment to chants.

The so-called "bull-roarer" was also manipulated, and even at the present time is brought into active service by some of the ghost dancers of the prairie tribes. This instrument is usually made of a small, thin piece of wood having a buckskin thong or other cord attached at one end, while the other end of the cord is tied to a longer piece of wood acting as a handle to facilitate the rotary motion.

General Conclusions.

It will be noticed, from the foregoing, that a large number of errors about the North American Indians have prevailed until very lately, some of them still surviving, and that they have not been held exclusively by ignorant persons, but, on the contrary, are found in the publications of reputable authors. One of the errors not before mentioned is that the color of the Indians of pure blood is red, while in fact it is brown, though of many varieties of shade, every one of which corresponds with the hue of some one or more peoples of the subdivisions of the human family in the Eastern hemisphere. It is possible that the liberal use of red ochre upon the exposed surface of the body by some of the tribes which the early explorers and pioneers met, was the occasion of the false report upon which was based the theory of a grand

Navajo dance of Nahikàĭ.

division of mankind styled the "red race." Thus the peoples of the Western hemisphere, from their first discovery, were considered to be substantially different from those of the other parts of the world, and therefore to be treated by governments and individuals in a manner which would not be right as applied to other human beings.

The wildly mistaken accounts of their numbers, and of their unexampled extinction by the "withering and blighting influence of civilization," have been noticed above at sufficient length, and produced the theory of *feræ naturæ*, which, supplementing the one last mentioned, fixed the Indians in a category of hopeless abnormality, so that it was considered to be lost labor to attempt their permanent improvement. Even now high authority repeats the assertion that "there is no good Indian but a dead Indian," though, in fact, the ancestors of the persons repeating that phrase and those of the most cultured citizens of the United States have passed through the same stage in which the Indians were found, with only the unessential variations caused by environment. The differences in environment were chiefly remarkable in that they retarded the advance of the people of the Western continents through the several culture periods or stages. Each of these stages normally requires a growth through ages, and the tribes of men which reached civilization have, as it would appear, been obliged to pass through them successively. The American Indians, as above shown, were not nomadic until they obtained horses and firearms from or through Europeans; and, not being nomadic, they never passed into the patriarchal form of organization, which step, the next in orderly sequence, was arrested by foreign violence.

While their religions were much more primitive than that of monotheism, which has been generally and falsely attributed to them, they influenced the acts of their daily life and the conduct of their governments to a degree beyond that exercised by modern Christianity. Their creeds were largely concerned with two points of vital importance to the success of any attempts to establish compliance with the system set forth in the common and statute laws prevalent in North America. These points relate to the title to land and the inheritance of property, both of which have been discussed above. What the law of the United States declares to be right about the ownership of land, the Indian religiously believes to be a crime, and to him the usual provisions for the distribution of a decedent's personal effects are so ab-

horrent, that he prefers that the articles should be destroyed or buried with the corpse of their former owner.

Without referring to cases of oppression or neglect, and only considering the many experiments of sincere legislators and philanthropists to improve the condition of Indian tribes and individuals, it is clear that hitherto such attempts have had meager success; and it is also clear that they have been misdirected through utter ignorance of the Indian character and through false theories based on mistaken data. Only since 1879, when Congress established the Bureau of Ethnology, has there been any systematic endeavor, free alike from sentiment, greed, and preconceived theory, to study and publish the ascertained facts concerning the North American Indians.

CHAPTER V.

THE MISSISSIPPI VALLEY.

I. The Land.

The valley of the Mississippi River and its tributaries is the core of the republic. It comprises, between the Appalachian Mountains and the Rockies, about one million two hundred and fifty thousand square miles, almost exactly one third of the entire area of the United States. Within these limits are included nearly all types of soil and life that characterize the nation. The flanks of the valley rest in the extreme East and the far West, while in the North it touches the frozen clime of Manitoba, and in the South the great river empties among the semitropical foliage and fruits of Louisiana. There is the widest variety in its surface, including forest, prairie, and mountain, the richest soil and the most arid, great pastoral plains and closely tilled farm lands. There is the same variety in the occupations of the millions of people who live in this vast area. There are farmers everywhere. There are miners in the east, in Illinois and Missouri, on the slopes of the western mountains, and on the shores of Lake Superior. There are lumbermen in Minnesota and Wisconsin, sugar planters in Louisiana, cotton planters in Mississippi, manufacturers and merchants clustered in all the crowded cities. The resources for creating wealth are many and various; and all of them are eagerly employed with the energy, and with the success, too, that mark the great West.

The interchange of products which makes possible an advanced civilization requires means of communication and transportation that shall be convenient, rapid and comparatively cheap. This the valley affords, in the first instance, by its extensive system of water ways. The Mississippi is the great central artery of travel. From the head of navigation at Minneapolis to the Gulf there are twenty-two hundred miles of channel on which a steamboat may float. The two giant branches, the Missouri and the Ohio, penetrate the Northwest and the Northeast with twelve hundred and

fifty-three miles and ten hundred and fifty miles of navigable water respectively; and the innumerable smaller affluents of the main stream and of its two chief tributaries provide a large part of the valley with easy means of transit.

It is on the east that these smaller streams are especially valuable. On the west they are not so numerous, and are filled with shallows; but the southern branches of the Ohio have long stretches of deep water, enabling steamboats of considerable size to penetrate far into Tennessee. The prairie rivers that flow into the Ohio from the north are narrow and tortuous; still, their channels are deep enough to float small steamers and flatboats, thus enabling the farmer to reach the landings of the larger river with his produce.

But these numerous navigable streams are not the only means of reaching the valley by water. All along its northeastern slope lie the Great Lakes. This vast Mediterranean Sea of America reaches far into the heart of the continent, making navigation possible for large vessels from the Falls of Niagara to the shores of Minnesota. In the early days the settler from the East could thus readily reach his destination in Ohio or Michigan. If he then paddled or poled his boat up one of the streams that emptied into the lake, he could often by a short portage re-embark on the other side of the watershed and float down to the Ohio. Indeed, the elevation of the sources of the two sets of streams is so slight, and they are so intermingled, that it would in some cases be no great task of engineering to divert the waters of one in the other direction. This is actually to be done at Chicago. A deep drainage channel will connect the Chicago River with the Illinois. This will cause the current to set from Lake Michigan, thus not only carrying southward the drainage of the great city, but at the same time affording what can hardly fail to be ultimately a ship channel connecting the lakes with the Gulf of Mexico.

The present advantage of the Great Lakes to the northern part of the Mississippi Valley is something enormous. Great cities—Chicago, Milwaukee, Cleveland, Detroit, Duluth—have grown up from the traffic by water. A ready and cheap outlet is afforded for the products of the farms and mines, which in turn are exchanged for the wares of the East. Barges load at Buffalo and Cleveland with coal, and return with the wheat of Minnesota and the Dakotas, with iron and lumber from Wisconsin, or copper from Michigan. The commerce of the Sault Ste. Marie Canal surpasses anything imagined by those who have given it but

casual thought. The annual tonnage that passes the Government lock is actually far greater than that of the Suez Canal. The latter is the highway of nations; it is the route from Europe to India, China, and Australia; it is the outlet of that Oriental traffic for which Columbus was searching when he stumbled on America; and yet, in 1890, there passed through the Sault more than three times as many vessels and nearly a million and three quarter tons more freight than through the Suez. The value of the cargoes that passed the Sault in 1891 was over one hundred and twenty-eight million dollars. And this outlet taps only one end of the great valley, and is quite irrespective of the immense tonnage of the railways.

In the last half century the latter, indeed, have largely taken the place of water routes wherever it is possible for rails to be laid. They at the same time provide an outlet for commodities produced in districts remote from markets, and stimulate settlement and production in every direction. They have almost annihilated space. Distance no longer counts in miles, but merely in time. The farmer on the banks of the Mississippi is really nearer tide water to-day than was the resident of central New York when the century opened. The former may step on an express train at his home and in forty-two hours he is in New York. His journey has been smooth and agreeable. He has had a luxurious bed at night, and a hotel table replete with the luxuries of all climes is spread for him as he flies on his way. But in 1800 the traveler needed not hours, but days, to go from Albany to the metropolis. And to reach Albany from the interior was a long journey over rude forest trails and corduroy roads. The mail at that time took ten days between Albany and Canandaigua, a distance of one hundred and fifty miles. And the post traveled as much faster than the ordinary wagon as our fast mail on the trunk lines excels in speed the usual mixed accommodation train. Prices, too, were then high. Six cents a mile was a usual rate. It is now considered too much to pay half that amount, though the distance is covered in a small fraction of the time and with infinitely more comfort.

What is true of travel is in a still greater degree true of the transportation of merchandise. The farmer of Missouri or Dakota is able to find his market in New York or Liverpool, because he can have his grain hauled to the seaboard and carried by steam across the Atlantic at so low a rate that it is put down on the English docks at actually less cost than wheat raised in Ireland.

Steam has destroyed distance, and the rich, black loam of the prairie States easily outmatches the heavy British clays, when East and West are pitted together in the contest for commercial supremacy.

And that is not all. Intelligence is transmitted now much faster than material things. The telegraph informs the Western farmer of the probabilities as to demand and supply and prices; it keeps him informed as to the state of the crops in India and Russia, and the condition of business in London and Berlin. He knows when it is best to sell and when it is best to hold for higher rates.

These bands of steel which hold together the world are abundant in the Mississippi States. The total mileage of railways in the United States in 1890 was one hundred and sixty-three thousand five hundred and ninety-seven, and of these, ninety-one thousand six hundred and twenty-seven miles were between the Alleghanies and the Rockies. From Chicago, from Omaha, from Minneapolis and St. Paul, from Kansas City and Cincinnati and Memphis they radiate in all directions. The Valley States are woven together and to the rest of the Union by a network of railroads and telegraphs. These are the creators of the great cities that dot the West. They give value to the farm lands of western Kansas and Nebraska. In the early days of the Ohio River settlements the farmer never thought of shipping his grain. He raised quantities of Indian corn, but it was so bulky, and transportation was so slow and expensive, and prices were so low, that it was quite out of the question to haul it over the mountains and sell it in Philadelphia or New York; so the thrifty settler transformed his corn into hogs, and the hogs into bacon and hams. These latter he loaded on flatboats and floated down to New Orleans. By this slow and scanty trade he supplied most of his necessities. But corn in some shape was the staple on which he lived. Hog and hominy were his food, and whisky his drink —and hog, hominy, or whisky, in the last analysis, was merely a form of the invariable crop of maize that grew among the tree stumps. All this is changed. The log cabin has become a substantial frame house. The stumps are gone from the fields. The farmer's diet is as varied as his agriculture; and the one is made as abundant as the other is profitable, because the railroad has brought the market to his door.

In 1825 the Erie Canal was completed, and farming lands in western New York, which before that event could only reach

the seaboard in weeks, thereafter were within a few days of the metropolis. Before the canal was finished it cost one hundred dollars to transport a ton of freight from Buffalo to New York city; on the completion of the canal the cost at once fell to fourteen dollars; it is now a little less than three dollars. One immediate result of the construction of the canal, then, was to enhance manifold the value of what had been remote and comparatively useless land. The production of wheat in Seneca County, New York, for instance, at once increased fifty per cent. And, of course, immigrants multiplied in the same ratio with ease of travel and rise of values. The wilderness of western New York was soon a populous and thriving community.

The same results have come to a much greater degree from the general extension of railroads throughout the West. A farm in the moon would hardly be salable to-day in our real-estate exchanges; but the moon is little more out of reach than was North Dakota a hundred years ago. To-day that State is merely a rural adjunct of New York and Chicago.

Yet, while the railroads have given this vast impetus to settlement and the creation of wealth, the water ways are by no means useless. The lakes, the rivers, and the canals are still crowded with craft. Transportation by water costs less money than by land, and so is much more profitable for all bulky articles, and for those especially in whose value great speed is not an essential factor. Lumber, coal, and wheat are largely shipped at lake and river ports. Then, too, water transit forms a valuable regulator of the railroad management. The competition of steamboat and barge tends to keep railway rates at a reasonable point; and so the time will probably never come when business will be quite monopolized by the railroads.

It has been objected by some that the Mississippi runs the wrong way. The Atlantic coast and Europe are the objective points of the traffic of our Western States. If the great river ran east instead of south, so that its mouth were at New York rather than New Orleans, the volume of its business would be enormously increased. It would form a parallel water route with the lakes, and between the two the railroads would be held in pretty steady subjection. It does not pay to ship wheat to Europe *via* New Orleans; it takes too long, and the cargo has to pass through a hot climate that heats and injures the grain. But direct shipments to New York by water would be in great demand. No doubt this is true. The great lines of trade, like

the great lines of migration, seem to be on the parallels of latitude; and the Appalachian Mountain chain was upreared without much regard to these economic facts.

However, while it is true that the Mississippi is of less importance relatively than before the great extension of our railroad system, still it even now plays an important part in the business life of the West; and it seems more than likely that in the near future its importance will be vastly increased. It is the commerce of Asia which has largely made the wealth of Europe; and when the Nicaragua Canal is completed, a direct and short water route to China and Australia will at once be open to the ports of our Atlantic coast. But the Mississippi pours its flood into the Gulf in almost a direct line for Nicaragua. New Orleans and St. Louis will be nearer Hong Kong than is New York; and the ship canal from Lake Michigan will enable vessels to load at Chicago direct for Sydney or Canton.

This is not an idle dream. The Nicaragua Canal has been begun. The nation that has spanned the continent with the Pacific Railroads, that has built the Brooklyn Bridge, that has created great manufactures and amassed wealth second only to that of England, will not fail sooner or later to complete it; and when that is done, it will add new intensity to the vigorous life which already throbs in the great central area of the republic.

There is room for expansion; for the Mississippi valley is in all ways a most typical portion of our country—*the* most typical portion, in fact. Aside from free institutions, nothing is more characteristic of the American Republic than its extreme diversity. There is the widest range in climate, in quality of soil and forms of relief, and especially in the races and characteristics of the people that make up our sixty-five millions. Nearly every feature of the whole Union is found in the central valley. The climate ranges from the rigorous winters of northern Minnesota to the subtropical mildness of Louisiana. The natural products are as varied. The depths of the earth yield petroleum and natural gas in the eastern part, coal through considerable areas, farther west, lead, iron, and copper in quantities. The greatest wheat fields in the world and the greatest milling industries lie in the north, while at the other extremity are the sugar plantations of Louisiana. The corn belt in Illinois and Iowa and Kansas produces boundless quantities of that grain, and the cattle ranges on the western extremity of the valley maintain herds sufficient to feed the nation.

Humboldt said that the Mississippi Valley is the largest valley in the world. He referred, of course, not to the area in miles but to the fact that it had the largest extent of arable soil, and the least amount of desert waste and barren mountains. That it is the most valuable valley in the world, may be added.

In comparing the two sides of the valley one is struck by the fact that the eastern is the more attractive. Its soil seems in general more fertile, its forests more exuberant, its navigable streams more abundant and widely disseminated. Thus the land immediately west of the Alleghanies was a strong attraction to settlers from the time it was first known by white men. When the Rev. Manasseh Cutler was pushing before Congress, in 1787, his scheme for the settlement of the Western country, he was assured by the geographer of Congress that "the Muskingum watered the richest and most salubrious part of the whole Western country." And the advertisements of the Ohio Company were glowing and at the same time hardly exaggerated. They assured the people that "a man of push and energy could nowhere be so prosperous and happy as in the West. The climate was delightful; rain was abundant; the soil rich, and watered by broad rivers, along whose banks were great bottoms and natural meadows from twenty to fifty miles in circuit. There the forests of oak and black walnut, sycamore and maple, were free from underbrush, and the noble trees thrust out their branches so far on every side that a man in a single day could clear an acre of land fit for planting Indian corn. Indeed, the trees were so far apart he need not chop them down. He had but to girdle them, while each maple he spared would yield him ten pounds of sugar every year."

This was the popular account of the Ohio country. When Daniel Boone first looked on Kentucky it seemed to him a bit of enchanted ground. He says, in somewhat stilted words of Filson: "We passed through a great forest, in which stood myriads of trees, some gay with blossoms, others rich with fruits. Nature was here a series of wonders and a fund of delight. Here she displayed her ingenuity and industry in a variety of flowers and fruits, beautifully colored, elegantly shaped, and charmingly flavored; and we were diverted with innumerable animals presenting themselves perpetually to our view." Boone was far from being the first white man to penetrate Kentucky, or the most important leader of the early settlement; still, he was peculiarly a type of the primitive hunter and backwoodsman, and the

romantic hue of his life and exploits have associated his name with the "dark and bloody ground" quite as closely as accident did that of Americus Vespucius with the New World to which Columbus by another accident pointed the way.

The early and thorough settlement of the West was greatly facilitated by this fact, that its most attractive parts were immediately contiguous to the populous States of the Atlantic coast. If the emigrants had been obliged to cross a long expanse of desert in order to reach fertile soil, the exodus from the East would have been tardy. The migration from Europe would have been much more difficult to set in motion, and the whole process of the conquest of the valley for civilization would have been materially different, as well as much later in point of time, than it actually was.

II. How the United States came to own it.

The land of the Mississippi Valley, thus richly endowed by Nature, came into the possession of the republic by a chain of causes that belong to the romance of history. That this great central empire is American, and not French or Spanish or English, is due to no one fact alone. Indeed, if any one of a series of events had taken another turn, the course of things might have been very different; and if it had turned out that the Union had been limited by the Alleghanies, or even by the Mississippi, on the West, we should to-day by no means be the imperial power that the great republic in fact is. We should be at best a nation of the second rank, unable to cope either in war or commerce with England or France or Germany.

And that is not all. The relations of the States to one another and to the Union would have been radically different. The great fact of the first century of the American Union is, that it has grown to be a nation. In 1776 it was a confederacy, and a very loose one at that; in 1876 it was a nation, and a very coherent one. And the addition of new States from the public domain is what, more than anything else, cemented the loose aggregation of discordant States into this solid republican empire. If the original partners to the compact had remained the only ones, the schism between North and South could hardly have been prevented. Calhoun and not Webster would have been the authoritative expounder of the Constitution, and in all likelihood Mason and Dixon's line would to-day part two independent and mutually jealous little republics. The possession of the West by the Union turned the current of history.

The land between the Alleghanies and the Rocky Mountains was in early colonial times claimed by England and France at the same time, and the first settlers on its soil were French. Louisiana was a populous French colony. French posts were established at strategic points—at Pittsburg, at Detroit, in Illinois, at Mackinac. The long struggle for dominion between the Frank and the Saxon had many vicissitudes. It was for a long time by no means sure that the entire civilization of North America should not be Latin rather than Teutonic. The genius and inflexible determination of William Pitt were what turned the scale. The French were at last overthrown. The treaty between France and England in 1763 abandoned to England all the region east of the Mississippi; all the land to the west of that river went to Spain.

Thus one step was made. France was eliminated for the time being from the problem of empire. The Mississippi and the land it drained were divided between mighty Britain and feeble Spain. Thus the cis-Mississippi region was once for all devoted to English civilization, and the trans-Mississippi was virtually held in trust by Spain until some more virile power should be ready to take and use it. Spain could no longer colonize. She could barely hold the land under her flag, and the day was bound to come when feebleness must yield to force. What that force should be remained in the unknown future.

The next act in the drama was in 1783. The King of Great Britain in that year made a treaty with his rebellious American colonists, recognizing them as an independent nation, and dividing with them his once fair domains, and by that document the new Union was confirmed in all the old English possessions east of the Mississippi.

This result was by no means a foregone conclusion, nor was it reached by a simple exercise of diplomacy. The Americans held the land in dispute, having conquered it in the course of the war. But it was far from sure, at first, that they would be able to retain it. Their allies, the wily French, had no notion of allowing the young republic to be too strong, and so they proposed that the bulk of the territory north of the Ohio River should be yielded to England; then, a broad strip in the Southwest should be allotted to the Indian tribes, as a sort of "buffer state" between the Americans and the Spaniards. This scheme would have shorn the republic of nearly all on the west side of the mountains.

Franklin, the leading American commissioner, was too old a bird to be caught with chaff, even if it came from a loving ally.

He, too, was ready with a proposition quite as audacious. He coolly proposed that not only the land east of the Mississippi, but all Canada, should be ceded to the United States. As the outcome of these warring propositions and counter-propositions, the Americans finally obtained a share to which they were without doubt fairly entitled. All that had been English east of the Mississippi and south of the lakes was yielded to the republic. And thus one half the valley came to its manifest destiny. The forests of Kentucky and Ohio were endowed with the potentiality of becoming free States in the free Saxon republic.

Two more decades passed. Jefferson sat on the republican throne at Washington, and Napoleon on the consular throne of France. The mind of the great Corsican was filled with world-wide dreams. He would take up the plans of colonization which had dropped from the feeble hands of the Bourbon kings. He acquired Louisiana from Spain, and he meant to fill it with an aggressive French population. Spanish feebleness was replaced by a living force. And if this force should transform the wilderness into a new France, with the tricolor at the mouth of the Mississippi, the American Union would be hemmed in once for all between dangerous neighbors. Its growth would cease, and the prosperity of its western moiety would be at the mercy of the French prefect at New Orleans; for the commerce of the settlers west of the mountains of necessity went to that city, and there was no market for their surplus hams or flour but in New Orleans; so these commodities were loaded on flatboats and floated down to that port. And then came the trouble. New Orleans was in possession of a foreign power. The Governor could refuse permission for the American produce to be landed or to be transhipped. He could tax it, or turn it back altogether. The only exit for the commerce of the valley was in foreign hands, and the prosperity of the farmers and traders of Kentucky and Ohio was wholly at the mercy or the caprice or the hostile interests of these remote European officials. The valley was like a great jug, of which a foreign power held the mouth and the cork.

This state of things had hampered settlement, and had made those who did settle restless and turbulent. Some had proposed that the West should secede from the Union altogether and join the dominions of Spain. Others proposed to seize New Orleans by force and annex it to the territories of the United States. Others still would have formed an independent State of

the American lands west of the mountains, with the addition of a large portion of the Spanish domain.

It was while affairs were in this unpromising condition that Louisiana was ceded to France by Spain—and Louisiana meant all the country from Texas to British America between the Mississippi and the Rocky Mountains. This cession was ominous to the Americans. If the Spaniards were troublesome neighbors, the French were likely to be dangerous. The Spaniards had barely held possession; the French meant to push colonization. The Spaniards had been a passive obstacle to American enterprise; the French would be very sure to become active rivals. With Spain at New Orleans all things were at least possible, but France would hem in the Americans on the west quite as effectually as did England on the north.

To relieve the situation, President Jefferson in 1803 sent commissioners to Paris empowered to treat for the purchase of New Orleans. The mouth of the river, at least, it was felt must be in our hands. We could not afford longer to expose the growing interests of the West to so humiliating, so exasperating a check. The commissioners were authorized to offer Bonaparte two million dollars for the outlet of the valley.

The moment was marvelously opportune. The First Consul was fast drifting into a war with England, and one immediate result of such war would undoubtedly be the loss of Louisiana. England was mistress of the seas. A French colony was impossible while English fleets could cut off all succor and could land English troops at any point with impunity. And, at the same time, war meant money. A tidy sum in cash would be a great help to Napoleon in beginning hostilities; and so he amazed the American envoys by offering the whole of Louisiana, from the river to the mountains, for eighty million francs (about fifteen million dollars)!

The envoys had no authority to make any treaty so extraordinary. But the chance was too great to be lost; no such opportunity might ever come again. If England should once get Louisiana, the case would be hopeless. And there was no telegraph cable for instant communication with the home Government. Accordingly, the commissioners assumed the responsibility. They closed the bargain, signed the treaty of cession and the accompanying conventions guaranteeing payment, and trusted to the gravity of the emergency for their vindication.

The dilemma was a curious one. There was no warrant what-

ever in the Constitution for the acquisition of foreign territory; and Jefferson and his party were committed to strict construction. Still, the situation was such as hardly admitted even hesitation. The prize to be secured was so vast, the danger to be avoided was so imminent, and the opportunity so advantageous, that all other considerations could only be set aside. It was not safe to delay, as the chance might slip through the fingers while constitutional questions were being debated, and so the work of the commissioners was promptly ratified. Constitution or no Constitution, the Mississippi question was once for all set at rest, and the western border of the republic was moved westward to the "Stony Mountains."

This great achievement of Jefferson was not wrought without opposition. The Federalists in Congress fought it bitterly. They assailed the treaty as a piece of wanton folly. The desert bought with so enormous an outlay was, it was said, really worthless. No one knew what lay beyond the Mississippi. But it was clear that the wilderness was vast—so vast that it could never be settled. If it should ever be settled, the result would simply be a republic so unwieldy that it could not hold together. It was absurd to suppose that representatives would ever come to Congress from the slopes of the Rocky Mountains. As well expect to construct a State from a slice of China or from South Africa. As to Kentucky and Tennessee, if their people were dissatisfied with the Union as it was, let them go. They were of no sort of use anyway. The whole territory west of the Alleghanies was little better than an incumbrance. It was too far away from anywhere to be of any value, and here was a new territory purchased that was yet farther away! Again, supposing, after all, that the Western lands should fill with settlers, that result would constitute a real danger rather than a benefit. It would simply mean that the best blood of New England would be drained off to this Western section, leaving the East weak in people and in wealth.

All this sounds odd enough to us. We are familiar with all parts of a much wider republic than even Jefferson's purchase contemplated. It excites no comment for a special train to set out from the Golden Gate of California, carrying not representatives to the national Congress, but delegates to a national political convention which gathers at some Atlantic coast city. We have seen population rolling up in the West at such a rate as the world never before dreamed of, and yet the East is not depopulated

or impoverished. But what to us are the commonplaces of every day, to our grandfathers, when the century opened, were beyond the wildest visions of a disordered imagination. They knew nothing of steam or the telegraph. They had no conception of the tide of emigration that should soon sweep millions of brawny hands from Europe to the Western plains. And, above all, they were animated by a bitterness of political hatred such as we can with difficulty realize. Anything that Jefferson did was of necessity dangerous and wicked. That was the brief creed of the Federalists, and their unquestioning conviction of the truth of that creed gave vividness and force to their honest doubts of the legality or wisdom of the great purchase.

Fortunately for the nation, the Federalists were a helpless minority in Congress. The treaty with Napoleon was ratified. The Mississippi Valley in its every part—every foot of ground whose drainage ran toward the Father of Waters—was now American. It was the greatest achievement since the adoption of the Constitution, as that was the next great achievement after the winning of our independence from England. In building up the republic the name of Jefferson we should honor second only to that of Washington.

It was in these two ways, then, that the United States came to own the Mississippi Valley, and both great acquisitions were due to what would commonly be called lucky accidents.

It is true that in a broader view of history there is no luck. There is no event without a cause. Each age, with its trials and sufferings and triumphs, is a direct product of forces which we can usually trace. Still, when some of these forces converge just in the nick of time to produce results of wide beneficence, we must rejoice in what surely seems a most fortunate concurrence of things. It was just such a fortunate series of happenings that made the great valley American.

If, when our commissioners at Paris, in 1783, were negotiating the treaty of peace with England, English military forces had held the forts in the territory north of the Ohio River, we should never have been able to extort that rich country from England. Ohio and Indiana, and Illinois, and Michigan, and Wisconsin would to-day be part of the Dominion of Canada. Chicago and Cincinnati would be English cities. The Great Lakes above the Falls of Niagara would be British waters. Kentucky and Tennessee would in all likelihood have cut loose from the East and have joined their neighbors on the North or the West.

There would never have been a reason for purchasing Louisiana. The American Republic to-day would be on the eastern slopes of the Alleghanies—a slender territory, surely. England would have conquered Louisiana from France in 1804, and the imperial power of North America to-day would be not the United States but Great Britain. The heart of the continent—the valley of the Mississippi—would in every acre be under the flag of St. George. But it happened otherwise, and it so happened because of George Rogers Clarke and a handful of Virginia militia.

During the Revolutionary War the attacks of the Indians on the Virginia frontier were peculiarly exasperating, and these attacks were instigated from the British forts in Michigan and Illinois. To cut up this sort of warfare by the roots, General Clarke gathered a small force of volunteers, and, under orders from the State of Virginia, set out not only to subdue the savages, but to capture the posts which supplied them with plans and arms. He was completely successful. One after another the posts surrendered, and so it was that at the close of the war nearly all this great territory was under the American flag. Hence it was easy enough for the commissioners to insist that we should of course retain what we had; and so we retained the great Northwest.

The instigation of Indians to burn and pillage and massacre on the American frontier was not a mere accident. It was a part of the deliberate policy of Lord George Germaine, in the hope that the rebellious colonists might thus be worried into submission; and the infamous device recoiled on his own nation. England lost the golden Northwest simply because the English minister formed and executed the cruel plan of letting loose the savages on the defenseless American settlers. It is not always that national crimes are so soon and so signally punished.

The acquisition of Louisiana seemed quite as fortuitous. Had it not been that Napoleon became involved in hostilities with England, he would not for a moment have thought of parting with his cherished province in America. He had vast plans for its settlement and development. These he abandoned reluctantly, and only perforce. He sold Louisiana rather than see it fall into the long list of colonies that England had added to its roll by conquest. Again, unless the Americans had acted with promptness, the precious opportunity would have vanished. Had the Federalists been strong enough even to cause delay the moment would have gone by forever. England would have sent a fleet

to New Orleans, and the great trans-Mississippi region would have belted in the States on the West forever.

On incidents so slender do great historic results sometimes depend.

III. What the United States did with the Valley.

The history of the world has never before known such a series of events as transformed the Mississippi Valley from a desolate wilderness to an abode of busy civilization. Other migrations have been known. Nations have changed their home, but at no other time has this been done on so grand a scale, in so few years, and with results so far-reaching. The contrasts are startling.

Nations that have migrated in past ages have usually been at a low stage of advancement themselves, and not infrequently have destroyed higher forms of life which they displaced. So in the new lands the whole process of development has begun low in the scale, and has advanced slowly and very irregularly. The immigrants into the Mississippi Valley took the place of a lower and sparse form of civilization. Not only that: the newcomers brought with them the appliances of a high degree of progress. They had the Church and the common school and the printing-press, and so almost at once the solitary forest and prairie became vocal with the glad sounds of human industry.

The discovery of the continent of North America in 1497 by John Cabot had for a century little result in the way of settlement. The Spaniards came up from Mexico, perhaps in 1640, and made Santa Fé their capital. The same people settled in Florida at St. Augustine in 1565. The French penetrated the St. Lawrence and fixed their homes at Quebec in 1608; and the first English homes were reared in Virginia in 1607. But these beginnings had small and slow results. After two hundred years of effort there were scattered along the Atlantic coast not more than six million Europeans, from Labrador to Darien. In the single century in which we live there have come into the Mississippi Valley not less than forty million souls. New York in 1783 had but little more than thirty thousand, and Philadelphia but little more than forty thousand people, and at that time New York had been founded more than a century and a half, and Philadelphia a full century. Cincinnati, begun in 1788, had in 1890 nearly 300,000 people. Minneapolis had less than six thousand in 1860, and one hundred and sixty-five thousand in 1890. Chicago in 1837 had four thousand

souls; in 1890 there were over a million. And these are but types of the process that has been going on through the century.

The production of wealth has kept pace with the increase of population. As the eighteenth century neared its end the scattered farmers along the Ohio made a rude living from Indian corn. They were only too glad to exchange a small surplus of hams and flour with the Spaniards in Louisiana for a few of the comforts of life. To-day the upper valley States send abroad enough wheat and flour to feed a large part of Europe. The farmers of the West can compete successfully at Liverpool with grain growers in the British Islands. Cattle from beyond the Mississippi not only feed New York and Boston, but are beginning to displace the roast beef of Old England. And not agriculture alone absorbs the energies of the West. The great cities that are scattered over the area that in our grandfathers' times was a solitary waste are centers of active manufactures and extensive commerce. The second bank in the United States in volume of business is in Chicago. The greatest flour mills in the world are in Minneapolis, with a capacity of nearly fifty thousand barrels a day.

The settlement of the Mississippi Valley is the first instance in history of the reduction of a wilderness in a single lifetime. Not a few men are now living who were pioneers in this great movement. To-day their home is amid a civilization vastly richer and more complex than that they left when they came West. And the reasons for this extraordinary metamorphosis are not far to seek.

The nineteenth century is the master of a control over the forces of Nature such as no past age has witnessed. Machinery, steam and electricity are its servants, and by these agencies human power is vastly multiplied. The settlement of the Mississippi Valley is the first fruit of the application of this new mastery over natural forces to the development of a raw land. Since then we have seen the conquest of the Pacific slope and of the mountains. Australia has been created. Africa is being subjugated. But the first triumph of steam applied to transportation was in the pouring of a ready-made nation into the great valley beyond the Alleghanies. When steamboats were put on the Western rivers, and the Atlantic passage was reduced from a month or six weeks to one or two weeks, it became a comparatively easy thing for the farmer in Massachusetts or the peasant in Germany to reach a new home. The chains which keep the masses in place have been time, expense, and discomfort. Steam at one stroke

has largely eliminated all these. A mere distance in miles does not count if only one can pass over it rapidly, cheaply and comfortably. Indeed, one is more likely, being once in motion and having no particular reason for stopping, to go one hundred miles than ten if it can be done just as well. This, then, is the first factor in the population of a new land—facility of getting to it.

And this same beneficent steam, that removed difficulty of transportation from the path of human progress, has at the same time and by the same means destroyed the second impediment to colonization. It does not much matter how easily one can get to a place, if it does not pay to be there. Why should the Eastern farmer or the Irish laborer go so far from the associations of his home life unless by so doing he can put himself into a better environment? And a better environment may mean a variety of things. It must usually include, first of all, a better living—better food and shelter and clothing. It may imply means of education and religious expression, and more attractive political institutions. But this second class of conditions will quite generally depend on the first. Material needs are the foundation of life. All this was easily solved for the immigrants into the West. The soil would produce abundantly, and the same ease of transportation that brought the settler to his home, at once made it possible for him to reach a market with his surplus, and thus he was able to transmute his labor into all that variety of forms which at the same time gratify and stimulate human wants.

The hardy pioneers who first penetrated across the mountains into Kentucky and Ohio made but slow progress. It was not easy to reach their destination. It was out of the question to transport the produce of their farms back over the Alleghanies to Eastern marts. The long flatboat journey to New Orleans was their only resource; and the returns were as scanty as they were slow. But the steamboat and the canal cut a speedy path into the heart of the continent. This at once opened a channel both ways; immigrants poured in, produce poured out.

But it was not merely as a field for settlement and the development of civilization from the crude materials of a new land that the Mississippi valley has had a place in the growth of the republic. It has played a most important part in the political life of the nation. It has transformed the essential character of the United States as a political entity, and it has had a vital share in the great struggles that have marked the century.

When our Government was formed, the thirteen States regarded themselves as in many ways mutually independent. The Constitution they felt had been granted by themselves. In ratifying it they had given up something which they possessed, and had given it for the general welfare. But, after all, one who has had a thing and has yielded possession of it is in a different position and has a different feeling from one who has never had it at all; and this was just the difference between the original thirteen and the new States. The latter did not concede a Constitution to the Union. On the contrary, the Union conceded to them Statehood. They were only grantees, and had never been grantors.

Accordingly, the direct result of the settlement and admission of the new States was a strengthening of the sentiment of nationality. The citizen of Ohio was never an Ohioan quite in the sense that one Southerner was a Virginian and another a South Carolinian. Besides, the short time in which the settlements grew up, and the constant changes that were going on in the process, hardly allowed the immigrants to fix their roots so deep in the soil as was the case in the older States. They might be resident in Ohio to-day, and in a few weeks move to Illinois or Iowa; but they were always Americans. And so it was that early in the century a new school of politicians grew up in the land west of the Alleghanies. These were the "Young Republicans," and their peerless leader was the brilliant Henry Clay, of Kentucky. They were intense patriots and nationalists. It was they who forced the conservative and traditional Republicans of the Middle and Southern States into war with England in 1812. That war was in defense of the national honor, and it was Henry Clay's war. Again, when the war was ended, it was the Young Republicans of the West who led in Henry Clay's new policy, in which they gloried, as the "American system." And this policy was far-reaching. It meant not only the encouragement of American manufactures; it meant also a thorough system of internal improvements, by which communication might be made easy and cheap—roads and canals. It meant also the hand of sympathy to other communities on the continent that were struggling for their liberty—it meant the Monroe doctrine. Clay would gladly have given tangible aid to the revolted Spanish colonies, but he could not carry the country with him.

It was because of this burning spirit of nationality that Clay could not endure the thought of danger to the concord of the

republic from the slavery question; and so he helped on the Compromise of 1820, and in 1850 invented that last Compromise which staved off civil war for another decade.

But the West had its share, too, in these great disputes which rent the sections asunder, and not merely an incidental but a vital share. The Mason and Dixon line, extended westerly by the Ohio River, divided the valley as well as the East into slave and free States, and so arrayed them on opposite sides in the contest of arms. Not only this. It was the admission of Missouri that precipitated the first real collision between the opposing forces. It was the settlement of Kansas and Nebraska that brought the question to the issue of arms. It was the election of a Western Free-Soiler to the presidency that set the secession ball a-rolling. And there was no mightier campaign in the civil war than those fought out by the Western armies. Shiloh and Chickamauga and New Orleans and Vicksburg were all in the valley of the Mississippi.

If there had been no Western territory, the bond of union would in all probability have been weaker. Disrupting forces would quite likely have torn the republic asunder long before 1861, and secession would have been unresisted, whether North or South had taken the initiative. On the other hand, had there been no Western land, there would have been no question of extension of slave or free territory; there would have been no dispute over Missouri or Kansas, no "squatter sovereignty" or border war. And so in many ways the possession and development of the West have powerfully affected the politics of the country. And the political center of gravity is even yet moving steadily from the East. The day is not far distant when the West will be the controlling influence in national politics.

IV. Character and Order of Settlement.

The reclamation of the land west of the Alleghanies from a state of nature is as interesting in the order and sequence of its processes as for its extraordinary results and for its bearing on the development of the republic. The vast area included naturally led to an order of evolution in some respects materially unlike that of any other part of the Union.

The first pioneers of the wilderness were Frenchmen. Adventurous fur traders from Canada crossed the divide and floated down the Ohio, and finally the Mississippi, long before an English word was heard on those waters. Others came up from New Or-

leans, and gradually a slender network of French posts planted at strategic points made sure the communications between Montreal and the Gulf of Mexico. Some of these posts grew into settlements of French people and ideas—Detroit, Vincennes, Kaskaskia, St. Louis, Natchez. But the reservoirs at New Orleans and Quebec were at best but scantily filled. The force of impact from the home country became exhausted. The military power of England prevailed in the long duel with France. And so the French influence, strong at the mouth of the Mississippi, stronger yet at the mouth of the St. Lawrence, through most of the Mississippi Valley became in time almost inappreciable. In Illinois and Minnesota it is but one of the curiosities of historical investigation.

The first Englishmen to cross the Alleghanies were also fur traders and hunters. They were in jealous rivalry with the Frenchmen for the traffic with the Indians, and this dispute for furs was the natural precursor of the later dispute for land.

There is no passion more characteristic of the Anglo-Saxon race than land hunger. As soon as a portion of this race has spread over a given area, and reached the limit, not of its possibilities, but of its productivity with the appliances at hand, the instinct at once is not to seek better means of tillage, but more land to till in the old way. So it was that the farmer followed in the wake of the roaming hunter, and the people of Virginia and Carolina drifted through the mountains and built their cabins and planted their cornfields in the wilderness of the West.

The settlement of the valley by the English-speaking peoples which now occupy it falls into four rather distinctly marked periods differentiated by the evolution in means of transportation.

Immigration implies the transfer of people, and more or less of their effects, from one place to another. The kind and number of people who emigrate, the nature and bulk of the movables that will be transported with the owners, and hence the whole quality of the movement of population, will then depend largely on the difficulties of travel to be overcome and on the means at hand for overcoming them.

The first epoch was that of the forest trail. There were no roads. The frontiersman led his pack horse through the defiles of the mountains and among the trees of the open forest till he reached ground which suited his fancy. He erected a blockhouse without nails, scratched the soil with rude tools, and lived quite as much on the produce of his skill with the rifle as on that of his industry with the hoe. When enough settlers had thus made

their way into the woods to warrant greater exertions, a rude road was cleared, and the stout wagon drawn by oxen or horses enabled the farmer to convey more of his goods to his new home.

It was this epoch which saw the primitive settlement of West Virginia and Kentucky and Tennessee. The settlers were Virginians and Carolinians of British stock. They were the daring pioneers whose homes were always on the extreme verge of civilization, and who found an added zest in the occupation of choice land in the heart of the Indian country, remote from the defense of settled law and military force. People fitted for such enterprise were, doubtless, somewhat rude. They were certainly forceful. Energy and courage are not effeminate qualities; and without these such a migration as that of the Western borders would have been impossible.

This, then, was the character of the first epoch. It was English. It was energetic and self-reliant. Alone in the remote forests, the settlers defended themselves from the savage, made their own laws, and organized their own government. The movement was individual. It had the backing of no public authority, no land corporation, no organization of any sort. It was merely the spontaneous action of homogeneous people under similar conditions of life. It is said that if a number of Americans should be shipwrecked on an uninhabited island, their first proceeding would be to hold a mass meeting and organize it by the choice of a chairman and secretary. Somewhat of this Anglo-Saxon instinct for civil order was shown by the pioneers across the Alleghanies. They cleared the woods, made their homes, and then set up government. The Tennesseeans, chafing under neglect, established an independent State, which existed for some little time under the name of Franklin. The Kentuckians sought independence from Virginia, but always under the forms of law. And, finally, each community succeeded in securing civic autonomy. The rifle, the axe and the hoe were not all that the pioneers carried through the forest trails. They were imbued with the ideas and methods of civil liberty. It was law, and not license, that they took to their distant homes.

The second epoch in the process of settlement was that of the flatboat. As soon as immigrants in sufficient numbers reached the numerous water ways of the valley, they availed themselves of these natural avenues to extend and accelerate their progress. This flatboat was in point of evolution one degree in advance of

the raft; it was commodious and safe. It would transport greater cargoes than many wagons or pack horses, and, so long as directed with the current, would move with considerable speed. And in this way colonies gathered from New England in 1788, settled in Ohio, and in succeeding years occupied other points in that and neighboring States. By this means of transport the current of immigration became a steady stream. Not isolated families, as on the western slopes of the Alleghanies, or scanty villages, as in the forests of Kentucky, were the product of this stage of the movement. In Ohio and along both banks of the beautiful river from which the State takes its name, populous little towns sprang up in the wilderness like magic. Marietta, Losantiville (an absurd name, soon changed to Cincinnati), Louisville, were the germs of cities. The wave swept back from the Ohio, up the affluent streams, and into the interior. But nevertheless every settlement was on some navigable water, and fleets of flatboats and keel boats continually brought recruits from the East.

This second wave of immigration was materially different from the first. It was more numerous. It was also gathered from the farther East. It was not formed from the skirting borderers who could only breathe on the fringe of civilization, and who delighted to plunge farther and farther into the wilderness. These wanderers on the forest trails might aggregate in little groups for defense from Indians; but their joy was in a solitary existence. A neighbor within ten miles made these Ishmaelites feel crowded. They needed breathing space. On the contrary, the river settlers loved to build their homes together. They created towns, and aspired to make them cities. They were no nomads. Most of them were from the heart of old communities—hard-headed and hard-handed Yankees from New England, Scotchmen from New York, thrifty Germans from Pennsylvania. It was not adventure, but improvement of material conditions, which primarily affected them. Again, not a few were directly from the Old World—English, Irish, French refugees. It was these last who founded Gallipolis, in Ohio. By means of the river craft they were able to reach remote points in the West, though little inured to the hardships of forest travel.

The use of the rivers as paths of immigration meant, then, a great and rapid increase in numbers, a steadier and more advanced type of civilization, and a greatly multiplied diversity in the kind of settlers.

But the rivers had a second use. They not merely afforded avenues for the ingress of population; they as well provided egress for surplus of produce. It was not enough that the new settlers found the rich soil of the West respond bountifully to tillage—not enough that they had but "to tickle the soil with a hoe, and it laughed abundant crops." Unless a part of these crops could be exchanged for other commodities, the resources of the settlers would be scanty indeed. Corn meal and pork would answer for food, but they were hardly available directly as clothing or shelter or furniture. And into all these they could be transmuted only by the alchemy of commerce; and for this the flatboats provided means. They were floated down the Ohio and the Mississippi, until among the Frenchmen and Spaniards of New Orleans a market was found. Flour and bacon and hams were wanted in Louisiana and the West India Islands. These food products the Americans along the Ohio had in boundless quantities. And the rivers at once opened a broad and easy route for conveying the abundant supply to the region of the demand.

To one inconvenience the river boats were subject. They would float down stream with ease, and, when propelled by pole or oars, with tolerable speed; but to return up stream was quite another matter. Some few were laboriously poled and rowed up the rivers to their homes; but nearly all ended their voyage at New Orleans, and there were broken up for lumber. The results of the traffic were usually embarked on shipboard, and thus conveyed to the ports of the Atlantic coast, and thence over the mountains to the Ohio Valley. This was a long and circuitous route; but the current of trade usually flowed in just that roundabout way.

The time consumed was very great. A light boat with only two or three passengers could go from Pittsburg to New Orleans in somewhat less than four weeks; a heavy barge would take at least seven; and if it was attempted to stem the current and thus return up the rivers, the time was correspondingly greater. No less than three months would often be used in the voyage from the Gulf to St. Louis.

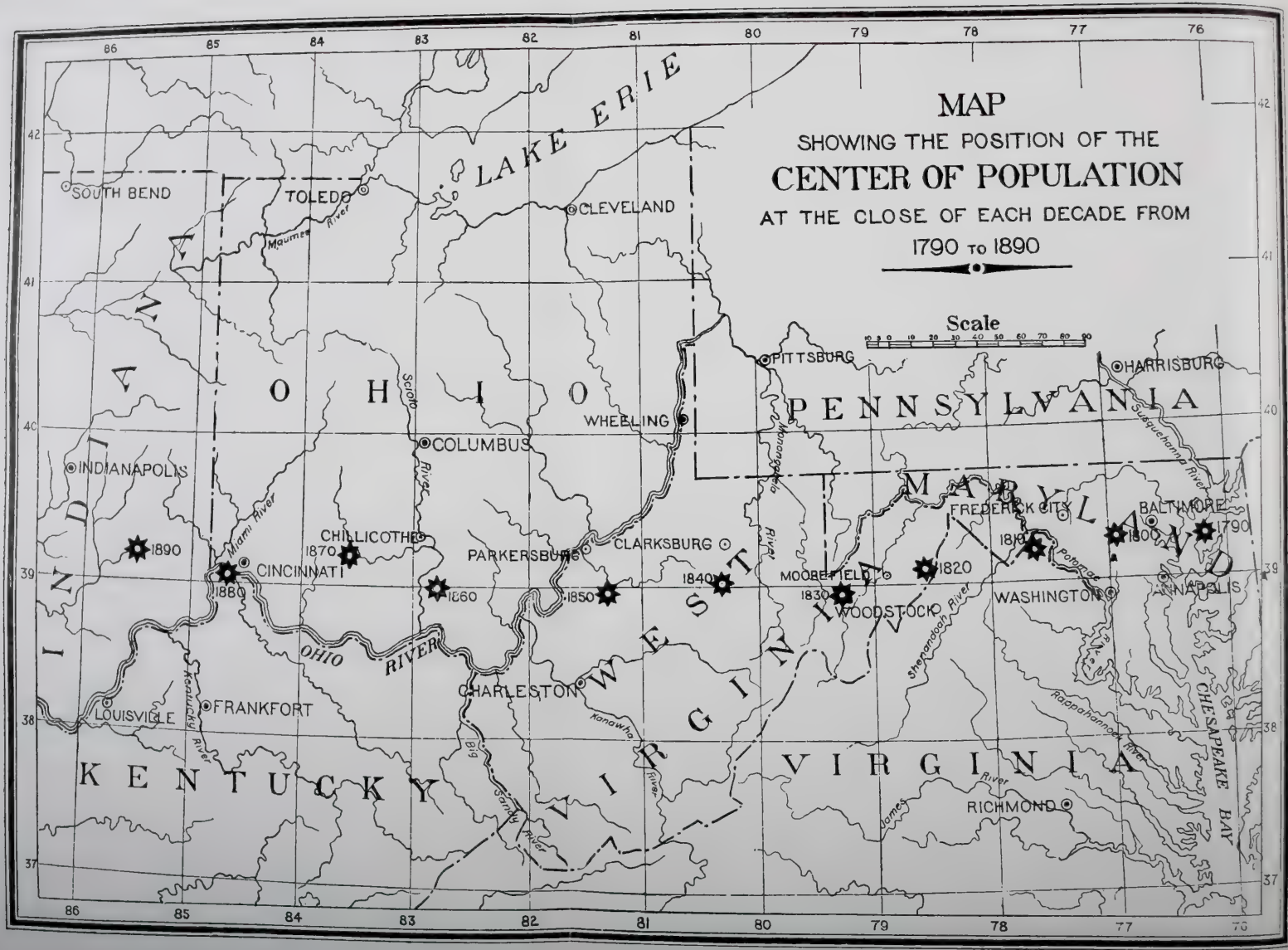
As the farms became more numerous along the Ohio their owners grew venturesome in seeking a market. The many deep and sluggish rivers that fed the Ohio from the north provided outlets for a great expanse of country; and the farmers, even long after steamboats had been common, were in the habit of taking cargoes to the distant Southern market in person. It was an ac-

customed sight for the level prairie to be broken by a flatboat gliding apparently over its level surface, with brawny young men steering and fending it from the banks. As time went on, very few men had not made one or more voyages to New Orleans. It came to be a sign of inertness, indeed, not to have made at least one such trip.

The effect of this custom on the character of the Western people was quite marked. The life of the settler was usually rather solitary. He lived much alone with his family. But the tendency of a lonely existence to harden and stiffen character was counteracted by the results of travel. The farmer's vision was not bounded by his farm or by his little neighborhood. He saw many changing scenes. He mixed with men of all sorts. The busy and romantic life of the river, the thronged levees and streets of New Orleans, the keen competition of trade on a large scale, all tended to broaden the farmer's sympathies and to quicken his intelligence. Thus the farmer in the valley settlements was broader of mind, quicker of thought, more brimful of energy than his compeer in the older States.

The next era of migration was heralded in 1811 by the first steamboat on the Western waters. This was the "New Orleans," built at Pittsburg, and designed to ply between New Orleans and Natchez. As it ran down the Ohio, making extraordinary speed in comparison with anything before known, the quiet denizens of the forests along the river banks were amazed and frightened by the strange apparition. Not a few of the more ignorant folk thought the Day of Judgment was at hand, as they watched the shower of sparks and heard the rush of the wheels. And when the craft stopped at Louisville, well along in the night, and let off steam, the roar from the escape-pipes brought a good share of the town tumbling out of their beds to see what was the matter.

This pioneer boat was followed by others in quick succession. The great network of rivers in the valley had now found its appropriate means of navigation. The number of steamboats on the Mississippi and its tributaries in 1834 was two hundred and thirty, with an aggregate tonnage of thirty-nine thousand. The entire tonnage of the keel boats and flatboats on the Mississippi and its tributaries in 1817 was about six thousand five hundred. The time to New Orleans was greatly reduced, and, best of all, it was found that the new power enabled boats to stem the flood of the great river at a reasonable pace, so that


MAP
SHOWING THE POSITION OF THE
CENTER OF POPULATION
AT THE CLOSE OF EACH DECADE FROM
1790 TO 1890
Scale
LAKE ERIE
SOUTH BEND
TOLEDO
CLEVELAND
Maumee River
INDIANA
OHIO
PITTSBURG
HARRISBURG
PENNSYLVANIA
Scioto River
WHEELING
Monongahela River
COLUMBUS
Susquehanna River
INDIANAPOLIS
MARYLAND
FREDERICK CITY
BALTIMORE
1790
1800
1810
1890
Miami River
CHILLICOTHE
1870
CINCINNATI
1880
PARKERSBURG
CLARKSBURG
1860
1850
1840
MOOREFIELD
1830
1820
Potomac River
ANNAPOLIS
WASHINGTON
WOODSTOCK
Shenandoah River
WEST VIRGINIA
OHIO RIVER
CHARLESTON
Kanawha River
Rappahannock River
CHESAPEAKE BAY
LOUISVILLE
FRANKFORT
Kentucky River
Big Sandy River
KENTUCKY
VIRGINIA
James River
RICHMOND
86
85
84
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it was no longer necessary to convey merchandise by the Atlantic route. The steamboat Enterprise, in 1817, ran from New Orleans to Louisville in twenty-five days, instead of the three months required for a boat propelled by hand. The gain in time over the flatboats, indeed, seemed at the moment something marvelous. A firm advertised for patronage on the ground that its boats could make nine miles an hour. And with this speed of transit the Mississippi Valley became at once a boundless mine of wealth. People could easily reach its fertile soil, and the product of their labor could find a market at remunerative rates.

The immediate result was seen in a great increase in immigration and the growth of settlements. In the United States west of the Alleghanies there were, in 1790, about one hundred thousand people, besides the Indians; in 1800 there were some three hundred and eighty thousand; in 1810, one million; in 1820, two million five hundred thousand; and in 1832, four million. This last number exceeded the whole population of the republic at the time that Great Britain recognized our independence, in 1783. And the territory of the valley was carved into States and admitted into the Union in rapid succession. Kentucky in 1792, and Tennessee in 1796, had become States before the eighteenth century closed. The settlements on the Ohio and along the shore of Lake Erie had become a State in 1802. Louisiana was received in 1812; then came Indiana, 1816; Mississippi, 1817; Illinois, 1818; and Alabama, 1819. Missouri in 1820, Michigan in 1835, and Arkansas in 1836, made ten States—nearly as many as had revolted against Great Britain in 1775—that were now under the flag west of the mountains, within the first half century of national life under the Constitution.

This great development of what had been the trackless wilderness was furthered by a variety of causes all operating together. The invention and use of steamboats was one; another was the fact that the economic conditions of the country took an abrupt turn with the end of the long period of European wars. The battle of Waterloo, in 1815, terminated a quarter century of the greatest wars in history, in which all Europe was involved. During a large part of this period the capital and industry of the United States were very largely engaged in the carrying trade on the ocean, which the neutral character of our flag made enormously profitable. But gradually the nation became involved in difficulties with the belligerents, which difficulties culminated

in Mr. Jefferson's embargo, in 1807–'09, and the second war with England, 1812–'14.

These two events for the time being put an end to the shipping interests of Eastern and Middle State capitalists, and at the same time threw out of employment many thousands of seamen. Then, when the general peace came, with the final overthrow of Napoleon in 1815, the advantage which the United States had possessed as a neutral was of course lost. All these things together tended to divert the capital and labor of the seaboard into new channels. Much of it embarked in manufactures, thus in no great time transforming the economic character of our Eastern States. And much more of this surplus energy flowed off into the West. Coming as it did at the same time that steam navigation had made travel easy and rapid and the products of the fertile soil of the West a source of profit, this change in the general direction of industry powerfully stimulated the growth of the valley States and Territories.

Another fact that tended in the same direction lay in the conditions of life in Europe. The long wars had wasted and impoverished every European nation. Great public debts had been incurred. Taxes were correspondingly burdensome. At the same time the artificial prosperity that the wars had created at once vanished with the peace. All Europe had danced to the music of Bonaparte's cannon. Now all Europe must pay the fiddler; and, as invariably occurs, it was the poor who felt the burden most heavily. The Peace of Paris was followed by years of industrial depression and great suffering among the laboring classes.

This was not all. The defeat of Napoleon meant the triumph of reaction. The bright dreams of the French Revolution had faded out. The "rights of man" had become a laughing-stock. Practically every throne on the Continent was now held by a despot; and in England Toryism was supreme. Tyranny was everywhere a grinding fact. It now seemed to be a settled doctrine that "one half of mankind was born saddled and bridled" for the other half to ride.

The only bright spot in the general darkness was America. Here was a free republic. Here was equality before the law. Here was no hereditary privilege. And, besides all this, here was abounding prosperity. Taxes were low. There was no crushing militarism. The production of wealth was expanding enormously. And here, too, just in the nick of time, it was possi-

ble to reach the rich soil out of which light labor easily persuaded vast crops. So the introduction of steam coincided not only with the changed state of business in our own country, but also with a situation in Europe that powerfully impelled the masses to seek a better home; and our ports were filled with immigrants.

Prior to 1819 our Government kept no statistics of immigration; but from the census of 1820 to the present time we have carefully collected data; and it is an interesting study to trace the steady increase, with occasional fluctuations, of the living tide from Europe. Many remained in the Atlantic States, but large numbers pressed at once into the West; and so the nature of the population in the new States was materially modified. In fact, the different lines and sources of the early immigration impressed a character on various parts of the West that has become fixed apparently for all time. The original settlers were Americans from the Atlantic States. They gave a form to society and institutions which no subsequent European immigrants greatly changed. The latter, on the whole, served to fill up the outline which the Americans so boldly sketched. The European immigrants, indeed, themselves became Americans; and the thoroughness with which such masses of foreigners have been absorbed and assimilated is one of the wonders of modern political life. Still, distinct lines of cleavage yet mark communities that had a different origin.

The New Englanders went due West, following the parallels of latitude. Large sections of southern Ohio, and the "Western Reserve" of that State, on the shore of Lake Erie, were settled quite solidly by people from Connecticut and Massachusetts, and in those sections of Ohio there is yet a new New England. In religion, in politics, in education, in social customs and ideas, the typical qualities of the New England Yankee are modified only by the largeness of view and energy of action that the new environment of necessity implies. The Congregational churches of Ohio are quite like those of Connecticut in their powerful influence on the community. The Western Reserve and Dennison Universities remind one of Williams College and Brown. Joshua R. Giddings and Salmon P. Chase were naturally political coworkers with Sumner and Phillips in the antislavery cause.

The same thing is true, again, of large portions of Indiana and Illinois. It is still more emphatically true of Iowa, which was created by New England. It is true of both Dakotas, which were flooded by New England blood from Iowa. It was lumbermen

from Maine who first exploited the pine forests and vast water-power of Minnesota, and the North Star State to this day is in touch with the rugged thought and austere life of New England. And Kansas, in the bloody days of 1857 and '58, was seized and held by a body of Yankee free-soil enthusiasts, who have left their mark on her legislation and her society.

The emigrants from Virginia, having crossed the mountains, poured out toward the West in a more fan-like order. They occupied Kentucky; they crossed the Ohio, and built up large districts in the State of that name; they filled a large part of Indiana, and powerfully affected Illinois. These Virginians and Kentuckians were in most cases slaveholders, or at least in sympathy with slavery. They desired to hold slave property in their new homes. The Ordinance of 1787, on which the political institutions of all the Northwest were founded, explicitly forbade that institution. Repeated efforts to secure from Congress a repeal of the anti-slavery clause having failed, and the Compromise measures of 1820 having definitely barred slavery out of all the remainder of the Northwest, the motives for further immigration into that section from the South were removed. And so the Virginia-Kentucky influence in the States north of the Ohio cease with the three States named—Ohio, Indiana, Illinois.

On the other hand, there was little or no attraction for settlers from the free States on the south of the Ohio. Kentucky and Tennessee were naturally filled up from the adjoining States on the seaboard—Virginia and North Carolina. Their institutions and habits of life were essentially Southern. And these strange social conditions, as well as the employment of servile labor, tended to repel farmers from Massachusetts, for instance, accustomed to different habits. And similar facts diverted the laborers of Europe away from States in which the relation of labor and capital was that of property.

In consequence of these things, the States in the valley south of the Ohio and those north of that stream came to diverge widely in the character of the population and the trend of their development. On the south slavery prevailed. A considerable negro population tilled the fields and did the necessary work of the household. On the north labor was free. The number of negroes was small. Labor of all kinds was done by whites. On the south the white population was, and largely remains, quite purely American. On the north there was a great mass of Europeans—Irish, German, Scandinavian.

On the south the employment of slave-labor and the traditions of the Virginia or Carolina home made the plantation the distinguishing fact of life. The growth of large cities was not encouraged. Kentucky was distinctively a land of rural homes. It was much like rural England in its habits of life. There were wealth and refinement. But the home, even of the most wealthy, was not a city palace, but a country seat. On the north, while it is true that in the early days agriculture was the leading employment, yet the tendency from the first was to aggregate in towns and to develop manufactures and commerce. And so a cluster of great cities has grown up—Cincinnati, Cleveland, Chicago, Milwaukee, Minneapolis, St. Paul, and many more.

The effects of all this are yet seen. In these three respects the States south of the Ohio still differ quite widely from those north—the presence of a large body of negro laborers, the relative purity of American blood among the whites, and the tendency to rural rather than urban life. It is true that the differences are becoming less marked. In the last respect especially changes are already apparent. But yet the impress of the original settlement is very persistent, and probably will long endure.

On the west of the Mississippi the character of early settlement and the results in the present condition of the States have been quite similar to those already detailed. Missouri and Arkansas received their settlers and their institutions from Kentucky and Tennessee. Kansas and the Northwest were filled and held by the same type of men that ruled from the Pennsylvania line west to the Father of Waters.

Louisiana, at the mouth of the great river, has had a peculiar character of its own. It is the only State of all our Union, aside from the Mexican cession, that was not Teutonic in the controlling quality of its early occupation and development by Europeans. There were French colonies in Illinois and Indiana, but they were so small as soon to be swallowed up by the mass of other settlement. Louisiana, however, was so overwhelmingly French in its population and in its resulting institutions that it has never lost this tincture. French speech and ideas still color New Orleans, and French blood flows in the veins of a large proportion of the ruling class in the State.

If the use of steam on waterways gave a great impetus to the evolution of civilization in the West, it can readily be seen that the application of the same agency to propel trains on land routes had a still more marked effect, and this last era of settlement has

been the most prolific in achievements. It is since the opening of railroads that the West has filled with people, and that its means of producing wealth have been exploited with the most abundant results. The once trackless wilderness is now gridironed with steel rails. The journey from the seacoast to the interior, that once consumed weeks, can now be made in as many days. And so, as the difficulty of movement that has made populations stationary, has steadily been eliminated, in the same proportion the uneasy masses in Europe have left their homes in search of better and happier conditions of life.

The Manchester and Liverpool Railway was opened for traffic in 1830, and proved an immediate success. This had been preceded in 1825 by an experiment on a merchandise road that showed sufficiently how well adapted the new motor was to supply the power needed for the increasing exchange of commodities in a modern community. Thus George Stephenson was the pioneer of this new era of transportation that has so thoroughly revolutionized the world. That there was opposition goes without saying. Those whose capital was invested in stage-coaches or canals were alarmed at the appearance of so resistless a competitor. The English country gentleman regarded the locomotive as a devouring monster that would destroy the privacy and beauty of his rural home. And the caution of the conservative Englishman was sufficiently indicated by the sage words of the British Quarterly Review: "We should as soon expect the people of Woolwich to suffer themselves to be fired off upon one of Congreve's ricochet rockets as to trust themselves to the mercy of such a machine going at such a rate." But the world kept moving, in spite of vested interests and selfish luxury and sluggish apprehensiveness. Railroads soon appeared in all parts of England.

In the United States railways were at once welcomed as the very thing most needed to help on the opening of a new country whose distances were so vast. In 1828 there were in this country three miles of railway; in 1830 there were forty-one miles; in 1840 there were 2,200; in 1850, 7,500; in 1860, 29,000; in 1870, 49,000; in 1880, 93,671; in 1892, 171,000. This development not merely connected the coast cities by a continuous chain of roads, but at the same time opened routes to the West, and either by the rivers or rail routes it thus became easy for the immigrant, once landed in New York, to reach any part of the Mississippi Valley—easy in point of money as well as of time.

But this was not all. During the same decades of the early

expansion of railroads, steam was being applied to navigation on the ocean. It was in 1819 that the Savannah, the first ocean steamer, crossed the Atlantic from America. In 1825 the Enterprise rounded the Cape of Good Hope for India. In 1840 the Cunard line was started, and thereafter the Atlantic liner became a regular feature of travel.

The effects of this new mode of crossing the Atlantic were not at first apparent in the handling of immigrants. In 1856 ninety-seven per cent still came in sailing vessels, but after that date the figures were rapidly reversed. By 1873 more than ninety-six per cent of our immigration came in steamers, and less than four per cent in sailing vessels.

But the railway era of migration, greatly aided in these last decades by the fleets of transatlantic liners, has been the most extraordinary in history. Since the battle of Waterloo some twenty-seven millions of persons have left Europe for other homes. More than half of this immigration (nearly fifteen millions) has come to the United States, and has been disseminated throughout the republic. As the years went on, what at first seemed a temporary movement of the floating part of European population, appeared a steady and permanent stream. The few thousands of 1820 became tens of thousands by 1840, hundreds of thousands before 1850, and in 1882 reached three quarters of a million.

Of course all this has meant a general stirring up and unsettling of European industrial populations. The immigrants before 1815 were as a rule the most restless and enterprising political refugees, or those whom some special calamity had deprived of hope in the home-land. But as a knowledge of the New World became more general, and at the same time as means of transit became less expensive, less uncomfortable, and more expeditious, many more were tempted to try a new clime in the expectation of bettering their condition. And so far has the process now gone, so cheap and easy a thing is it to cross the once terrible ocean, that to-day the very tramps and thieves, the scum of corrupt civilizations, are entering our republic in company with the industrious colonist. The present problem is not how to induce immigration of a desirable sort, but how to keep out what is undesirable.

V. The People of the Valley.

From the foregoing sketch of the way in which the Mississippi Valley became occupied by civilization, it is apparent that its

population is very varied in its origin. Each different source of migration is plainly evident in the people whom we find to-day in the different States between the mountain ranges. The Americans are everywhere—and by Americans we mean those whose ancestors were in America before the nineteenth century opened. But at an early date the valley witnessed the ingress of a motley population of many races. Flint wrote in 1832: "The people of this valley are as thorough a combination and mixture of the people of all nations, characters, languages, conditions, and opinions as can well be imagined. Scarcely a State in the Union, or a nation of Europe, but what has furnished us immigrants." And the growth of the young States has gone on in just the lines there indicated.

The immigrants from Europe have in general become diffused quite widely and mingled among the people from the Eastern States. Still, just as some sections of the valley were settled rather solidly by New-Englanders, like the Western Reserve, or by Germans from Pennsylvania, as is the case with a considerable belt across the center of Ohio, so not a few portions of various States have foreign settlements in masses. And this is especially true of Germans and Scandinavians.

The general distribution of the foreign immigration is indicated by the following table:* "The geographical relation of the foreign and colored elements of the population is complemental in a high degree. Taking the States of Delaware, Maryland, West Virginia, Kentucky, and Missouri as constituting a central zone neutral to the two elements, we have the following numerical proportions for each one thousand of the population:

	Colored.	Foreign.
Northern and Northwestern States	14	197
Central States	132	91
Southern and Southwestern States	415	22

"Some of the foreign elements are themselves in turn complemental in their location. Thus, two thirds of the Germans are found west of Buffalo, two thirds of the Irish east of it; the Scandinavians are mainly west of Lake Michigan, the British Americans east of it."

Thus it appears that the main body of the German and Scandinavian immigrants have settled in the northern portion of the

* First Century of the Republic. The figures are from the census of 1870.

Mississippi Valley. The Germans are especially numerous in Illinois and Wisconsin. The Scandinavians are strong in Wisconsin, Minnesota, and the Dakotas. A few figures will further illustrate. In 1880 Illinois had a total foreign-born population of 583,576. Of these, 235,786 were born in the German Empire, and 65,414 in the Scandinavian countries. Wisconsin, with 405,425 foreign-born, had 184,328 Germans and 66,284 Scandinavians. Minnesota had 267,676 foreign-born, 66,592 Germans and 107,768 Scandinavians. Of course, these figures consider only those who were born in foreign lands, and take no account of those whose parents or grandparents were of foreign birth. The results in such cases would not vary materially from those quoted. But if these should be added to those born in foreign lands, the number of those of foreign race in the first or second generation would be materially increased.

For instance, the census of 1880 gave Wisconsin a total population of 1,315,497, and reported of these 405,425 as born in foreign countries, and 547,580 born in the United States but having fathers born in foreign countries. Taking the nationality of the father as a basis, it is seen that nearly three fourths of the people of Wisconsin in 1880 were foreigners in the first or second generation.

When settlements are made in such masses, the immigrants retain much longer their home language and customs than if smaller numbers should be infused gradually among native Americans. Accordingly, we find the German and Scandinavian languages very widely used in the cluster of States in which those nationalities are so strong. German signs are very common in the streets of Chicago and Milwaukee. German newspapers are numerous and influential throughout the Northwest; and churches in which the services are conducted in German or Swedish or Norwegian are largely attended. There are counties in Wisconsin through which one may ride for miles among farms owned and occupied by Swedes or by Germans. There are extensive sections of Minnesota and the Dakotas in which the English language is rarely heard.

The reasons for the aggregation of people of the same race in adjoining territory are very obvious. Those coming as strangers would naturally seek the vicinity of settlers of the same blood and speech. Then, each family that found its new home a gain on the conditions of life in the fatherland would speedily communicate that fact to friends and relatives in the old coun-

try, and many would thus come to join the immigrants. Besides these reasons, which are always operative, there were many special schemes formed for making settlements of a specific kind. Just as colonies of New England abolitionists were poured into Kansas, so in many points there were colonies formed of Germans or Scandinavians. It was long a favorite dream with Germans to create a colony in some American State which should preserve German ideas and customs and the German language. It was even thought that so many Germans might be brought to some one State as to control it altogether, so that it might hold such a place in the American Union as the French province of Quebec does in the Dominion of Canada.

For this purpose, longing eyes were directed to Texas and Iowa and Wisconsin. At one time some of these enthusiasts schemed to Germanize Pennsylvania, seeking to make its official language German as well as English in courts and schools. This plan, however, was defeated in the Pennsylvania Legislature. In 1835 and 1836 societies were formed that had as their object the creation of a Germany in America; but the idea could never be realized, and was finally abandoned. Still, while the movement had little or no practical result in forming settlements, it doubtless served to keep certain sections of the West before the attention of Germans desiring to emigrate. And so, when they did cross the ocean, they naturally pushed on to a land with whose advantages they were already familiar.

The State of Wisconsin early took measures to attract immigrants from Europe. In its Constitution framed in 1848 was the very liberal provision that suffrage should be granted after only one year's residence, to "white persons of foreign birth who have declared their intention to become citizens." This provision was adopted under the influence of German delegates to the constitutional conventions, and of course it stimulated the stream of migration which the natural advantages of soil and climate and the easy terms on which land could be bought had already set in motion toward that State. In 1852 a law was passed providing for a Commissioner of Immigration, whose special function should be to advertise the advantages of the State and induce immigrants to settle there. This law remained three years on the statute-books, and in 1867 was re-enacted in the shape of providing a Board of Immigration. With some changes this scheme was in force until 1877.

By these various means an especially large tide of German

migration was attracted to Wisconsin; and as a result about a third of the people of that State are Germans—either born in Germany, or born in this country with both parents Germans. To sum up:

"The causes of the presence of this large German element among us must be looked for not primarily in plans to form a German State in the Northwest—though such plans have undoubtedly had their influence—but they are rather to be looked for in economic, political, and social influences. Among these were the natural advantages which this State possessed for Germans in the way of climate and productiveness, the low price of lands, due to the abundance of Government land and the peculiar policy of the State in disposing of its land grants for schools at low prices, for the sake of attracting immigration, and the opening of the State at an opportune moment. The German spirit in music, politics, and social life which early showed itself, particularly in Milwaukee, and which had its influence in shaping a liberal State Constitution, doubtless attracted the better elements. Again, the success of the Germans who came early to the State, particularly those from North Germany, has served to draw many others from the same region; and, finally, the State immigration agents, many of whom have been Germans, have directed their attention chiefly to Germany, with some success." *

Another European race element especially strong in the northern section of the valley is the Scandinavian. Since the civil war the Northmen have been coming from their homes in the north of Europe without cessation, and nearly all who land at once push on to the West. There were only eighteen thousand Scandinavians in the entire population of the republic at the census of 1850, and only seventy-two thousand in 1860. In the single year 1882 the number that landed at our ports was one hundred and five thousand three hundred and twenty-six. In the five years ending with 1885, 352,334 arrived; and in the next five years, 304,160.

"With a few minor exceptions, the whole movement has been unorganized, though agents of steamship and railway companies, and even some of the States, have systematically worked up immigration sentiment in the North lands. . . . The natural love of adventure, the prospect of the ownership of land, which is prac-

* How Wisconsin came by its Large German Element. By Kate Asaphine Everest, Fellow in History, University of Wisconsin.

tically impossible to the great majority in the old home, and the desire for greater personal independence—in a word, material betterment—these have been the motives of Scandinavian immigration. Letters from the New World, winter visits of prosperous immigrants to their old friends, the innumerable low-priced prepaid passage tickets, have been the most powerful preachers of the gospel of the New World's advantages. The broad, rich prairies of the Northwest have had from the first an Edenlike attractiveness to these North folk, coming as they have from a land where mountains, marshes, thin soil, and short summers made life a perpetual struggle for existence. It was the vision of level fields, of marvelous fertility that could be had almost for the asking, that cheered their tedious way across the ocean, up the Erie Canal and around the Great Lakes in the early days. Minnesota, Iowa, Dakota, are still the watchwords as they come, and are household words in almost every cranny from Hammerfest to Gjedser." *

The Scandinavians have very largely taken up farms. Few of them in comparison with the Germans, fewer still in comparison with the Irish, are denizens of cities. There are representatives of all these Scandinavian peoples in all the eighty counties of Minnesota; and in the newer counties of that State and the Dakotas from thirty to forty per cent of the people are of Scandinavian parentage. It is said that one may travel three hundred miles across Wisconsin, Iowa, and Minnesota without once leaving Scandinavian owned land.

This movement of the Scandinavians, as has been said, has very largely been unorganized and spontaneous. The same causes that led the earlier comers of them to the upper Mississippi Valley have continued to operate. And, of course, a powerful attractive influence has been exerted by the great body of their countrymen already living here. The familiar Norse tongue on every hand gives the immigrant a home feeling that, so far from the scenes of his former life, is very precious to him; and he needs something to assuage the homesick feeling. The Scandinavians are a home-loving people. A considerable portion of the inmates of Minnesota insane asylums are Scandinavians; and it is homesickness when superadded to discouragement that in many cases has driven the lonely wanderer insane.† But these are the

* Kendric C. Babcock, in The Forum for September, 1892.

† The late Probate Judge Von Schlegel, of Minneapolis, made this statement to the writer as a fact of the experience of the probate court.

exceptions. The mass of these Scandinavians have manfully met the difficulties incident to pioneer life in a new country and have conquered them. They have made prosperous and comfortable homes by thousands; and they have settled down contentedly under the Stars and Stripes as good American citizens.

A fair illustration of the way in which a settlement of homogeneous foreign elements was made, without any extraneous inducements, is afforded in the story of the founding of the city of New Ulm, in Brown County, Minnesota. This thoroughly German little city owes its settlement to a group of half a dozen immigrants of that nation living in Chicago in 1853. They joined together at first as a class to learn the language of their adopted country. Their success in this concerted effort led to the thought that they might combine for their further advantage in the purchase and settlement of land. They formed the scheme of getting beyond the reach of speculators, buying Government land, and laying out a model town surrounded with gardens. Accordingly, in July, 1853, a public meeting was held, and the "Chicago Land Verein" formed, with the objects named. After considerable time spent without success in investigation to secure just the right place, in the autumn of 1854 a committee of the Verein selected a spot in the then Territory of Minnesota, at a point where the Cottonwood flows into the Minnesota River. At this place the committee were met by twenty members of the Verein, and the band of pioneers spent the winter getting ready for active operations in the spring. In May, 1855, twenty more members of the Verein reached their comrades, and the new town was laid out. As many of the settlers were natives of Würtemberg, they chose the name of the famous old town of Ulm for their new home. Claim shanties were erected, a saw mill was put up, and all possible work was done toward securing title to the land. In the spring of 1856 a committee of the Verein, consisting of its president, Frederick Beinhorn, and Albert Blatz, arrived at New Ulm with the funds necessary to make the purchase, and this important formality was effected forthwith at the land office at Winona. To obtain the money thus used, each member of the Verein had paid in thirty dollars, and about two hundred and fifty men had done so. Each member, in consideration of this payment, was entitled to twelve town lots and nine acres outside the town.

Meanwhile another German society with similar purpose, "The Colonization Society of North America," was formed in Cincinnati. This was an outcome of the Turner movement, the

society being formed by action of the Cincinnati Turngemeinde. The scope of their plans was somewhat larger than that of the Chicago organization. The latter aimed primarily at better homes. The Cincinnati associates had in mind a wide scheme of opening the way for a broad and liberal development, physical and mental. It must be remembered that this was the time when Know-nothingism was rife in the East, and these Germans, disgusted with the narrowness and intolerance of that movement, sought room on the prairies of the West to carry out high ideals of German civilization.

In the spring of 1856 a committee of three men was sent west to find a suitable place for a colony. They looked through Missouri, Iowa, Kansas, Nebraska, and Minnesota, and in the last-named State fell in with the Germans who were just about to locate on the Minnesota River. William Pfaender, the head of the Cincinnati committee, liked the site, and entered into negotiations for a union of the two societies. On the following 4th of July an agreement was reached in Chicago, by virtue of which the Chicago Land Verein and the Colonization Society of North America were both merged into a new organization known as the German Land Association of Minnesota. An additional quantity of land was bought, making the whole amount over four thousand acres, of which seventeen hundred were laid out in the town site, and suitably apportioned among the members of the consolidated society.

The town thus started grew apace. Stores and mills were erected, additional German settlers moved in from the East, and prosperity attended their enterprise. German churches and schools were organized, and now New Ulm presents the picture of a thriving city of nearly four thousand inhabitants. It is German yet in the bulk of its population. Its churches are mainly German—Catholic, Methodist Episcopal, and Lutheran. German names predominate in its lists of officials.

And in similar ways many islands of European settlers have been formed in the Northwest.

VI. Social Development.

The development of social forms in a new country is the direct resultant of two forces: the character of the settlers and the character of the environment under which their new life goes on. Of course, this is merely a restatement for the community at large of the trite fact that the individual is the product of heredity and

environment, in varying proportion. The same is true of a collection of individuals; and while it is difficult to estimate the relative weight of the two forces, it is always interesting to trace their action.

Tearing up home life and transplanting it to new soil is not easy. It usually implies no little force of character, decision, courage. The immigrant must take large risks; he must undergo many hardships, and he must break away from the associations and affections of a lifetime. The indolent, the supersensitive, the timid, will always prefer to endure the ills they have rather than to risk making them worse in the hope of alleviation. This being the case, we must expect that those who left the East for Western homes should be, as a rule, the most forceful elements of the old population. They are the most energetic and persistent. Of course, this is only a general truth, to which there must be many qualifications and exceptions. The motive for migration is usually the desire to better one's lot; and those who have already attained prosperity under existing conditions will rarely seek to change them. And so it is clear that the bulk of the immigrants will be of those not above the middle class in point of financial strength. Again, lack of prosperity often results from lack of capacity, and such immigrants are perhaps as little likely to succeed in one community as in another. And in movements to new lands there will always be a proportion of those who have earned an unsavory reputation at home, and hope to escape it among strange surroundings, perhaps to indulge with impunity in a ruder form of society, and in comparative freedom from restraint, those inclinations which readily run counter to the established modes of thinking and acting so powerful in an orderly and long-settled community. Still, after allowing for all these, there remains the fact that generally one quality at least may fairly be expected among the settlers in a new country—energy. The weakling can not expect to cope successfully with the rude and hard conditions of a new life, and in the struggle for existence in the West the weaklings have usually disappeared. They have been eliminated by their own imbecility.

This forcefulness of the West is seen in all forms of social life. It is indicated by those modes of business and habits of action so familiarly known as "hustling." The Western man is bound to succeed, and sticks at no obstacles. A few years since the people of a certain religious denomination in Minnesota began to take measures for the organization of a church in a rising suburb of a

great city; but the management was in the hands of an Eastern society, and plans did not at once materialize in deeds. The members of another organization not radically different in creed learned what was contemplated. There was room at the time for not more than one church, and whatever one was the first to start was quite sure to be the leading one when the suburb should become populous. Accordingly, one Sunday afternoon about two weeks before the proposed meeting for organization under the auspices of the Eastern society the members of this other denomination held a quiet meeting on their own account. They then and there perfected a church organization, elected officers, appointed a pastoral committee and a building committee, and adjourned. The next day the building committee bought a lot, and on the following day began the erection of a temporary building. Meanwhile the pastoral committee telegraphed a call to a young clergyman to become their pastor; he accepted, and at once took a train for his new field. On the following Sunday, one week from the time of the original meeting, the completed building was dedicated by the new pastor. The other enterprise was abandoned. The church so rapidly put in form has to-day a fine house of worship and a large membership. Many such instances could be given.

The early settlers in the valley were neither very rich nor, as a rule, very poor. There was a general level in material conditions from which the variations were slight. All were engaged in the common struggle to subjugate Nature. The hardships of a pioneer's life were about the same for all. The successes won did not as a rule mean more than a fair degree of comfort. Under these circumstances it is clear enough that such a society, like any other, must always value most just those qualities that insure triumph over opposing obstacles; and that means energy, clear-sightedness, common sense. The higher refinements of life are out of place in a warfare with Nature; and the forceful attributes that lead to victory in that warfare are confined to no social stratum. In the free interchange of ideas that the varying circumstances of life on the frontier necessitate, natural qualities soon have their proper value set. A Clay, a Lincoln, a Garfield, may force his way from rude surroundings to the foremost place in the land.

In accordance with these facts, nothing has from the first been more characteristic of the West as a whole than the universal spirit of democracy. Plainness and equality have been the meth-

ods of life. The century ushered in by Thomas Jefferson's induction into the White House sent West a tide of Jefferson's ideas along with the tide of population; and so in theory as well as from force of surroundings the Western people have been the most characteristically democratic in their ways of all in this great democratic republic; and this has been evident in all things —in social usages, in politics, in religion. Andrew Jackson owed his marvelous hold on the people to the common conception of him as a blunt, plain, outspoken man, who had no finical ways, and who went straight to the point with the directness and the energy of a battering-ram. A Tennesseean slaveholder, he was a democrat by nature and by education. But this by no means prevented him from being most courtly and dignified in bearing. Democracy often gives dignity to manners, because that comes primarily from a sense of one's own worth; and the true democrat is unconscious of the superiority to himself of any other.

To be sure, the Kentucky aristocracy was and is as proud as any on earth. But, after all, it has always been a more democratic aristocracy than that of Virginia. Its spirit has penetrated deeper among the masses than it ever did east of the mountains. The dweller in the blue grass country, whether rich or poor, is equally proud of the land of his birth. And, again, the Kentucky and Tennessee poor below the mountains are not so poor as the "white trash" of Virginia and the Carolinas. The Kentuckians are not yet far removed from the days when civilization was achieved. The Virginians have long been the descendants of many generations from the conquerors.

Of late years wealth has come to the valley. Great cities have sprung up. The tendency to aggregate in masses, common to all modern civilizations, is not wanting here. Chicago is the typical marvel of American city-building. Cincinnati, St. Louis, Minneapolis, St. Paul, Omaha, Kansas City, have grown apace. That new flower of nineteenth century society, the millionaire, is sprinkled thickly in these and other crowded towns. But with the coming of the millionaire there has been very little importation of snobbishness. "The Four Hundred" are as yet an Eastern possession not envied by the West; and Anglomania has made little headway in the elegant mansions of Euclid Avenue or Michigan Avenue. In truth, a real aristocracy needs prescription; and Mississippi Valley millions are redolent yet of the stockyards and the wheat-field and the miner's lamp. Wealth has been acquired, not inherited; and although this by no means implies

inability to use it with good sense, it does imply that its possessor does not yet feel himself of finer clay than plainer living mortals. And so even the growing chasm between the very rich and the very poor has not yet effaced the deep impress of democracy that early circumstances fixed on Western character.

Naturally, a society filled with democratic energy is at times more or less crude as to the finer aspects of life. Force and fineness are apt to be at odds—especially when force is the one thing needed, and when fineness is rather difficult to attain or to retain. A log cabin is not of necessity the home of coarseness; but, other things being equal, a society that makes power its ideal is apt to be dominated by ruggedness rather than by elegance. And then, in a democratic community there is always room for individuals who in older settled regions would be relegated to a more retired sphere of action.

It was just this raw life of the frontier that Charles Dickens surveyed with so much wonder and amusement on his first visit to this country. That he was disgusted and enraged by some of its more obvious features was only to be expected. He knew nothing of sociology; he had no vision of what this rude life meant in its larger aspects. He utterly failed to comprehend what was going on in the new land which these restless and rude settlers were exploiting for civilized society. But then Dickens never did understand the deeper relations of things. He saw only what was on the surface, and from these surface aspects of the American West he drew the vivid caricatures in the "American Notes" and "Martin Chuzzlewit." They were caricatures with so many lines of truth that they threw the American people into a paroxysm of rage; but to us, looking back, the rage is quite as droll as the caricatures. Dickens could always paint a pig so deftly that one could almost hear the animal grunt, but a human face with a soul back of it was beyond his art.

The wealth gained now in the valley States is very great; the number of rich men is not small, and in the use of this vast wealth there is certainly shown as much intelligence and public spirit as anywhere in the nation. In the first place, what may be called the selfish uses of money show taste and understanding alike. There is abundance of good architecture. Homes are furnished artistically as well as luxuriously. Art galleries filled with really good and valuable pictures abound in many private homes. The children of wealthy families are highly educated, and their

members are refined and broadened by travel in all parts of the world.

But, after all, the measure of civilization attained by millionaires is the public and hence unselfish uses to which they devote their fortunes. To endow a family with an estate reaching tens and hundreds of millions is merely a triumph of personal vanity. To endow a great university, a hospital, a library, an industrial institute, not merely perpetuates a name, but at the same time extends substantial benefits to the whole community for countless generations. And such beneficence is a fact in every city west of the Blue Ridge. Chicago, St. Louis, and St. Paul are filled with these benefactions.

The peculiarities of social development in this new land whose people have poured in from all parts of the world exhibit another feature. There is the freedom from constraint and readiness to adopt radical views that one would expect in so energetic and practical a community. And there is also a powerful conservative influence. That these two tendencies coexist in the same people is by no means strange. Human nature is everywhere contradictory ; and the results are somewhat discordant at times.

These diverse tendencies are especially plain in religion and politics.

Not a few settlers in a new country are apt to lay aside the restraints of religion that perhaps lay rather loosely on them in their original home ; and hence many in the West have drifted from the churches, and either become indifferent, or ready to take up with all manner of vagaries that are at odds with received standards.

On the other hand, the home ties are very strong when they are strong at all. Ideas and customs current before migration become doubly dear when far from the surroundings in which they prevailed. And so when the church is reared it is not merely the yearnings of religion that it satisfies, but as well the hunger for familiar scenes and emotions. The direct result of this is not merely a persistence in the old forms even stronger than in the old home, but a strong disinclination toward innovation ; and so it is that in all the churches, on the whole, the West is really more tenacious of orthodoxy than the East. It is in New England that religious revolutions have arisen ; and the West has quite steadily opposed such movements. For the same reason, denominational lines are more closely drawn in the West.

The various religious sects are quite jealous of their autonomy and of their prominence. Union churches have been not uncommon in some parts of the East; they are rare in the West. In the small villages church edifices are multiplied. At State conventions of religious bodies home missionaries exhibit maps with counties maintaining churches of their particular form in white, and counties having no churches of their kind in black. The existence of any other sorts of churches is carefully ignored. Denominationalism and orthodoxy are, on the whole, strong in the West.

This peculiar conservatism, especially in questions of theology, seems at first view scarcely in consonance with the free and liberal air of Western sentiment on most subjects. One would perhaps more naturally look for the Western churches to be pioneers of speculative liberalism, as they certainly are pioneers in many questions of methods of work. Woman suffrage, coeducation, and a score of other notions sturdily opposed in the East, have been quite freely discussed and adopted in the West. And yet, when the Presbyterian Church is shaken by theological disputation, it is the conservative Western presbyteries that form an impregnable wall against heterodoxy.

The reason, after all, is easily found. The primary concern of Western life has long been the mastery of material conditions. This fact has, of course, impressed a fixed character on Western society. The Western man is bold, independent, and fertile in resources as he confronts the problems with which he must deal. His fearlessness becomes audacity on questions of business, of engineering, of the construction of cities; and in church work he applies the same methods. No one has more energy and originality in extending the bounds of his parish or in devising ways of dealing with the community of which his church is a part. But for these very reasons the Western man has little time to deal with questions of abstract theology; he is quite content to take them by prescription, and to devote his energies to putting in material form the agencies on which depends the material aggrandizement of his church. The Eastern man may speculate; the Western man acts.

The religious life of the valley was marked, as the nineteenth century opened, by the great revival which so strangely swept over Kentucky. There was an awakening to religious thought such as the world has seen only at long intervals. The rugged life of the frontier had given a materialistic tinge to the character of the

whole community, while the recklessness and coarseness natural to the rude conditions of the forest settlements seemed likely to banish finally all seriousness of thinking and sensitiveness of conscience. In the midst of this state of things came the revival. It was a religious frenzy which had many strange forms of manifestation. People wept and shouted, and threw themselves on the ground in delirious ecstasy; the most callous roisterers were seized by the influence that was abroad; camp meetings blossomed everywhere, and everywhere the same torrent of enthusiasm swept all before it. Sooner or later, probably half the people of Kentucky came under the control of this extraordinary religious power. It was not always lasting; so great excitement is, of course, apt to be followed by a corresponding reaction of lassitude, and there may be more refined ways of reaching and expressing religious sentiment than the wild fervor of these primitive days; yet it can hardly be doubted that, on the whole, the religious and moral condition of the State was permanently uplifted by the movement.

A religious map of the valley to-day would picture quite nearly the sources of the population. The various churches are strong about in the ratio of the race and State elements in whose home, east of the mountains, those churches predominate.

Kentucky was settled largely from Virginia. Accordingly, we find the Baptists, who among the classes apt to emigrate from that State had a strong following, are now numerous and powerful in Kentucky. The Scotch-Irish borderers in the west of Virginia also shared in the Kentucky settlement, and the Presbyterian Church followed in their steps. The movement of secession from that Church which resulted in the formation of the Campbellite body originated west of the Blue Ridge, and spread in a fanlike direction southwest and northwest. West Virginia, Kentucky, Ohio, Indiana, and Illinois are therefore the States in which this Church has its greatest strength.

The Congregational churches always mean New England, and the New-Englander in his movement westward kept to the parallels of latitude, shunning the line that separated slave labor from free labor. North of the Ohio River and of the Missouri Compromise line, then, we find Congregationalists numerous and influential; south of those limits they hardly occur. The Congregational Year-Book for 1889, for instance, shows in Kentucky eleven churches, every one organized since 1871; while in Ohio there were 236, dating from all along since 1796; in Illinois 269,

and in Iowa, a largely New England State, 261. Kansas was occupied just before the civil war by a flood of New England anti-slavery settlers, and this is significantly illustrated by the fact that it had, in 1889, 205 Congregational churches, while its neighbor, Arkansas, showed just 71, and these all organized since 1881. Minnesota, again, developed by hardy lumbermen and millers from Maine and New Hampshire, had 163 Congregational churches, while Tennessee had about two dozen, and Louisiana only sixteen.

Methodists and Baptists, of course, are everywhere; it was not any section to which they primarily appealed, but to certain elemental qualities in the average man. And so Mason and Dixon's line was no barrier; North and South, East and West, the plain people are found in multitudes under their banners. To be sure, that fatal schism which for so many years parted the sections appears in these churches, and the Methodist Episcopal Church South has its independent counterpart in the North, just as the Baptists of the North meet in one general convention and the Baptists of the South in another. These division lines run across the Mississippi Valley on the ancient barrier between the slave and free States; but otherwise the Baptist of Dakota and the Baptist of Tennessee are not materially different.

The main foreign element in the Northwest, we remember, is German and Scandinavian, with a considerable Irish element in most of the cities, and in consequence the national churches of these peoples are correspondingly strong. Roman Catholics and Lutherans are found by the thousand in all the States from Ohio to Montana, while in the Southwest the Lutherans are merely sporadic. Of course, the Roman Catholics are stronger in the last-named section; the French creoles of Louisiana are of that faith, and Irish and Germans are in all the cities, while some infusion of Maryland blood gives a certain amount of American backing to the old Church.

The adherence of the races from northern Europe to the two Churches named has produced some marked social and political results. These people are apt to act with a degree of solidarity on most questions, and when their cherished educational ideas were apparently assailed by one great political party the defection of German and Scandinavian votes gave an overwhelming political triumph to the other.

It can hardly be said that the West is distinctively a religious community in such sense as was Connecticut two centuries since.

But, for that matter, no part of the United States is now in that condition. The trend of modern religious life is materially different from that of the Puritans; and in the great cities in the valley —Cincinnati, St. Louis, Chicago—the European element is so large as to give them a character not at all Puritan. In nothing is this seen more plainly than in respect to Sunday observance. The curious overlaying of races which makes so much of the life of the republic is very obvious in the customs that intermingle in our city streets. On Sunday the shops and business houses, as a rule, are closed; but places of amusements of all sorts are usually open. In most cities of the West the saloons are required by law to be closed, but are, in fact, open as on other days; and in some cities they make no pretense of closing. The street cars are crowded on all pleasant Sundays, and parks, theatres, and beer gardens are populous; in fact, there seems to be shaping itself a new sort of Sunday. It is by no means that of the continent of Europe, for it implies cessation from most kinds of labor for profit; it is also by no means Puritan, for it allows recreation as an essential part of the day; it is religious, as a good part of every community is occupied in a variety of services of worship and religious instruction; and all branches of business connected with religious observance or recreation are generally prosecuted. Means of transit are used alike by church-goers and theatre-goers, by Sunday-school workers and frequenters of the parks. Most restaurants, tobacco stores, soda-water devices, and the like, do a thriving business.

This sort of Sunday may be better or worse than that of the Puritans; but it has probably come as a permanent custom. Details will doubtless always vex; but the conglomerate populations of our Western cities seem to have worked out a scheme which for them at least is satisfactory.

VII. Mormons.

Connected with the development of religious life is the attempt in some form or other to invent a new sort of faith, or a new way of living together under the sanctions of the old. The Mormon delusion is a fair example of the former, while the various communistic enterprises on a religious basis illustrate the latter.

The Mormons originated in the State of New York. But any form of religion so utterly at variance with accepted methods has usually the option of only two courses of action: to convert the entire community, or move out. The former the Mormons could

not do, so the latter naturally they did. After various desultory locations, they finally made two successive attempts at finding a permanent home in the Mississippi Valley. This was at a time when these States were but sparsely settled, and it seemed possible that some considerable piece of land might become their home without interference from outside influences.

The residence of the Mormons in Missouri was rather brief, their departure from that State being accelerated by complaints somewhat urgent in their expression, implying a failure on the part of the Mormons always to discriminate clearly between *meum* and *tuum*. Crossing the Mississippi to the east again, this strange people then took up their abode in Illinois, on the shores of the great river. Here for six years they lived and worked, trying to found a real Mormon State. Their city they named "Nauvoo"; and they aimed to make it a model of comfort and beauty. Here they began to erect a magnificent temple for the center of their worship.

These Mormons were not merely a set of crazy religious enthusiasts. They had no little hard business sense, and some capital, which they knew how to employ. It must be admitted that both in Illinois and in Utah they showed themselves industrious, frugal, and clear-sighted. Their farms were prosperous, their business flourished, they amassed wealth, they opened banking houses, and organized an elaborate civil government. When they fled from Missouri they were received by the people of Illinois with pity and hospitality, as persecuted and abused refugees. Then, too, every addition to the productive power of the young State was welcomed, and the newcomers promised to be a material addition to the Commonwealth.

No one is keener to scent a prospective advantage than a politician, and the solid Mormon vote was at once an object of rivalry between Whigs and Democrats. In 1840 the city of Nauvoo was incorporated, and, although the charter contained some very objectionable features, it passed both Houses of the Legislature without discussion or opposition. Power was given the new city to annex any adjacent land by merely laying it out in town lots and recording it, thus providing for indefinite expansion. The City Council of Nauvoo was empowered to enact any ordinances not repugnant to the Constitution of the United States or to that of the State, thus being really a co-ordinate body with the State Legislature, and able to nullify any legislation of that body so far as the city was concerned. The city courts had jurisdic-

Garfield Beach, Great Salt Lake, Utah.

tion limited only by appeal to the State Circuit Court; and the Nauvoo Legion was organized independently of the State militia, being answerable only to the Governor. In this way the Mormon city became an *imperium in imperio*, with the slightest dependence on the constituted authorities of the State; and all this came about because the rival political parties vied with each other in pandering to the Mormon vote.

The government formed under this remarkable charter was in effect an autocracy, of which the prophet, Joseph Smith, was the head. He was elected mayor. By virtue of this office he was President of the Council, and thus shaped legislation which as mayor he was to execute. He was also *ex officio* presiding judge of the municipal court, and thus interpreted the laws which he had assisted to make and which he had enforced. As commander of the Nauvoo Legion he added the sword to his other powers; and as prophet he commanded the implicit obedience of the people whom in his civil capacity he governed. Church and state could hardly be more closely united.

A power so far independent of the ordinary operations of civil government could not avoid coming in conflict with its neighbors. Trouble of various kinds broke out. The State of Missouri demanded the extradition of Joseph Smith and other Mormon leaders on the charge of a variety of crimes. This requisition the Mormons resisted, and so they came into collision with the authorities. Then it began to be suspected that the people at Nauvoo were plotting to establish on this remote frontier an independent government that should owe no allegiance either to State or nation. This is, in truth, what the Mormons afterward very nearly did in Utah. Only the accident of the annexation of that Territory to the United States at the close of the Mexican War prevented the success of a colonization scheme which Mexico could hardly have resisted. And the new revelation from heaven, by which the prophet learned that polygamy was still lawful, was not acceptable to neighbors who were disposed to regard monogamy as the settled policy of modern civilization. In various other ways the Mormons became obnoxious. They openly avowed their purpose to acquire all the land near Nauvoo, and it was alleged that in some cases they made Gentile owners anxious to sell by a system of petty persecution.*

* It is said, when they wished to possess the property of a Gentile, they offered what they considered a reasonable price for it, and in case of refusal they proceeded to enforce acceptance by various intolerable annoyances. Whittling was resorted to as one method

In these ways, and many others, the Mormons at Nauvoo gradually wore out their welcome in Illinois, and a series of collisions with the Gentiles near by, and ultimately with the State authorities, led to what has been called the "Mormon War." After many outrages, and those by no means all confined to one side, the Mormon state collapsed, and the "Saints," in 1846, were compelled by force to leave Illinois. Their prophet, Smith, had previously been taken from jail and murdered by a mob, and the fugitives suffered many hardships before they reached the promised land beyond the Rocky Mountains.

This episode is one of the strange results of a peculiar epoch in American history. There was a ferment of mind which led to many extravagances, especially as the American intelligence was, on the whole, somewhat crude. Reforms and "isms" were rife —dress reform, food reform, temperance, antislavery, woman's rights, communism, spiritualism, and what not. In such a soil the Mormon revelation took root and grew apace; and it was but natural that it should seek transplanting to a land where there would be less crowding. Ohio, Missouri, Illinois, were tried successively, but all proved unkindly homes. The Mormon experiment could not reach its fruition except in a wilderness far from human haunts. The Salt Lake Valley gave it a resting-place that seemed at first the very one needed. But in 1848 the United States "acquired" Utah, with other assets of Mexico, and at the same time gold was found in California. The one event brought the Mormons back under the American flag, the other opened their secluded valley to the tide of gold-seekers rushing toward the Pacific. Both together made the Mormon state impossible in Utah, as it had been at Nauvoo.

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of vexation. For this purpose three persons were appointed, who, armed with sticks and jackknives, took a position in front of the obdurate owner's residence and commenced whittling. If he went to church, to the post office, market, or other place of business, they followed him whittling. If he expostulated, became angry, threatened or swore, they answered by whittling. If idle boys laughed and jeered the victim, his tormentors demurely whittled. When he returned home the whittlers followed, and again took their places in front of his house and continued their annoyance from early dawn till late at night. The irritated owner could not look from a window without encountering the insolent stare of his persecutors, who were still whittling. Generally a single day, it is said, was sufficient to make him submit, very rarely he held out two days, but never was able to endure more than three days of this ludicrous yet insufferable martyrdom.—Davidson and Stuvé, *History of Illinois, p. 502, note.*

VIII. Communists.

The Mormon experiment was not the only social movement with a religious basis that the Mississippi Valley has seen. Such movements need land; and, in the days when the accessible new land lay between the great mountain ranges, projectors almost necessarily turned to the West. The good Moravians early had settlements in Ohio, and succeeded for a time in winning to a quiet and civilized life a group of the savages who had helped to make Ohio rival Kentucky as a "dark and bloody ground." But the turmoil of the Revolutionary War was too much for the success of this interesting attempt to civilize our aborigines by some milder method than the rifle. The Moravian villages were destroyed, and many of the Christian Indians were massacred. The missionaries were driven to Canada for refuge, and their Ohio settlement disappeared forever.

The community at Economy, near Pittsburg, was founded early in the present century by a band of Germans who fled from religious persecution at home. They adopted the community life as an essential part of their religion, deeming private property a mere product of the sin of selfishness. These Harmonists, as they are called, have been very successful in one way, having amassed property estimated now at tens of millions of dollars. They have lived a quiet, peaceful life, and perhaps have, on the whole, possessed one secret of happiness, even if they have not succeeded in reorganizing society at large on their model. Their numbers are small; at one time they had a thousand members, but now there are but three or four dozen. For many years past they have lived as celibates.

At Zoar, in Ohio, is another community of German religious enthusiasts. These worthy people had tenets not unlike those of the Quakers, objection to war being one of them. Such notions are hardly compatible with European militarism, and soon after the Napoleonic wars were ended the community in question left their homes in Würtemberg for the New World. Here they succeeded in acquiring a body of land in Ohio, on which they settled and where they have thrived by sober industry. Communism was not a part of their original scheme, but was adopted as a necessity in order to secure and retain the land that many individuals might have lost. They own land and manufacturing establishments enough to make the community independent and thoroughly comfortable.

In Iowa is the Amana community, another body of Germans whose community life is founded on religion. They, too, have succeeded in winning property to a large extent, and have a considerable membership.

These three are perhaps fair types of communistic experiments with religion as an essential element, that have, on the whole, been successful in attaining their chief aims. In all alike the members live a peaceful, uneventful life, without large anxieties or great ambitions. They are industrious, but free from the feverish rush that marks the scramble for the almighty dollar among their neighbors of the valley. They are apt to live to a good old age, and doubtless have a fair share of quiet happiness.

Whether the community life is a solution of many social problems, is a question to which perhaps more than one answer may be given. But there is no doubt of the entire sincerity of these people. Of their success in a worldly point of view there can be as little doubt; and they are united in deeming the religious life essential to a safe community.

These religious communities have been imported into the Western country from Europe. Those above mentioned are German. In Iowa a French community was founded at Icaria; and the Trappist monks in Kentucky are only another instance of seclusion from the world from religious motives by immigrants.

IX. Religion in the Constitution.

But the West has an indigenous religious feeling of its own, and in most of the valley States, this fact finds expression in the organic law. The preamble of the Ohio Constitution recites, "We, the people of the State of Ohio, grateful to Almighty God for our freedom," etc. The Illinois preamble recites: "We, the people of the State of Illinois, grateful to Almighty God for the civil, political, and religious liberty which He hath so long permitted us to enjoy, and looking to Him for a blessing upon our endeavors to secure and transmit the same unimpaired to succeeding generations," etc. These expressions or their equivalent are found also in the Constitutions of Indiana, Wisconsin, Iowa, Minnesota, Missouri, Nebraska, Kansas, Arkansas, Mississippi, and Alabama. This devout phraseology is in striking contrast to the businesslike curtness of the Louisiana preamble, which in its entirety is merely this: "We, the people of the State of Louisiana, do ordain and establish this Constitution."

Many good people have complained that God is not recog-

nized in the Constitution of the United States. The new Commonwealths, as a rule, seem not to be obnoxious to that charge.

X. Politics.

The trend of politics in the valley States is, like other social tendencies, the product of heredity and environment. In other words, the political ideas of the immigration and the circumstances that surrounded it in its new home together created a political atmosphere. The occupation of the West on a large scale coincided with the decadence of the old aristocratic Federalist party. The ideas of Jefferson prevailed in the nation at large; and the same circumstances which made social equality in the West a necessity—in other words, which made society essentially democratic—naturally re-enforced powerfully in that section the tendency to political democracy; and at first the Democratic Republican party of Jefferson commanded the undivided support of the Mississippi Valley.

The first division of parties in a presidential election was in 1796, when Washington retired at the end of his second term; and the last Federalist elector was chosen in 1816. During all that time not a Federalist electoral vote was cast west of the Alleghanies. Kentucky, Tennessee, Ohio, Louisiana, and Indiana, they were successively admitted, voted solidly for the Republican candidates—for Jefferson in 1796, 1800, and 1804; for Madison in 1808 and 1812; and for Monroe in 1816 and 1820.

But, after all, the politics of the young West was not the speculative democracy of the philosopher of Monticello. It was a vigorous, assertive national sentiment. It found its best exponent in Henry Clay, whom Kentucky sent as its choicest fruit to the Federal Congress, and whom the Blue Grass State never ceased to follow with a glad enthusiasm. It was the West which combined with the South to assail England in 1812, in defense of the national honor. The New England Federalists stigmatized the war as "Mr. Madison's war." They were totally wrong: it was Henry Clay's war; and the Kentucky volunteers were ready to march on Canada, or to follow Jackson to New Orleans, or wherever the national flag had need of strong arms and stout hearts.

After Mr. Monroe's second election, in 1820, new party divisions began to appear, and the West fell readily into the National Republican movement which allied Henry Clay and John Quincy Adams against the rugged new democracy of Andrew Jackson.

Kentucky and Ohio cast their solid vote of 1824 for Henry Clay, and in the same year Adams had one of the three votes of Illinois and two of the five votes of Louisiana. While Jackson was President his strong sway carried the West with him, save Kentucky, always loyal to Clay. The newly baptized Whig party of 1836 did not succeed in defeating Van Buren, but yet in that year William Henry Harrison won all the nine votes of Indiana, the fifteen of Kentucky, and the twenty-one of Ohio; and in 1840 Van Buren retained only Illinois and Arkansas in the West. Every other State in the valley was swept by the Whigs. In 1844 Henry Clay made his last effort for the presidency. He lost the prize, but Ohio, Kentucky, and Tennessee continued true to his banner. The last two States remained under the Whig banner in 1848 and 1852, as well as Louisiana in the former year. But here ended that gallant but unfortunate party. It was national in every sense, not sectional: it fairly divided the West; it carried Kentucky at every one of its five or six presidential contests, Indiana twice, Ohio three times, Louisiana once, Arkansas once, Tennessee three times, Mississippi once. Illinois and Missouri never chose a Whig elector.

After the election of 1852 the Whig party disappeared. The absorbing slavery question by that time had swallowed up Whig issues of high tariff and internal improvements, and at the next election the new Republican party appeared. Iowa and Michigan cast their first presidential votes for its candidates, and they were joined by Ohio and Wisconsin. The slave States, West as well as South, of course voted in 1856 for Buchanan. This unhappy sectional division in 1860 became still more marked, every free State west of the mountains voting for Lincoln, and every slave State against him; but even at that fateful election it was clear that secession was not meant by all the States which opposed Lincoln, as Kentucky and Tennessee both joined Virginia in voting for the Union candidate, John Bell; and Kentucky, at least, while its sons were divided in the sad contest of arms that followed, never forgot the national spirit of the times of Henry Clay.

Since the war political issues have been gradually shifting. The Northwest, as a rule, has steadily upheld the Republican party, and the Southwest has been uniformly true to the Democrats. The old line between slave and free States has still, on the whole, been a line between national parties. Indiana, to be sure, has been curiously balanced, inclining now to one party and now to another, thus sharing with New York the equivocal renown of being a

pivotal State; but aside from that, the Democrats have never since the war, until 1892, in a presidential campaign, carried any old free State in the Mississippi Valley.

While party allegiance has thus been pretty steady in these Western States, still there have been from time to time peculiar political movements which have set party calculations at defiance. These, as a rule, have come from adverse economic conditions for which some popular and easy remedy has been sought, and the attempt has been followed often by a political convulsion of more or less violence.

Financial panics have been felt severely in the West; the hard times of 1819, the great crash of 1837, and the corresponding disasters of 1857 and 1873, all swept their waves of business trouble over the States in process of settlement. Indeed, they have been peculiarly exposed to danger from these times of constriction. Speculation and credit are inseparable from the antecedent conditions that seem to produce a business panic, and credit and speculation are just what the settlement of new States invites as almost matters of course. As the tide of population rolls into a new land its resources are eagerly sought and rapidly developed; the rush for a favorable location creates towns and cities, and wherever there is a water power, a mine, or especially rich arable land, there is opportunity for the quick creation of wealth. Labor and brains are supplied in profusion, capital meets with large returns, and whoever has it at command is easily master of great gains. Naturally, then, any one able to secure credit will use it eagerly to exploit the forces of Nature that he sees about him in such profusion; whether farmer, manufacturer, or merchant, the process is the same. A small amount of borrowed capital, secured by mortgage on land, crop, or stock, has often enabled the agriculturist to get a piece of land from which one or two years' returns have put him out of debt and thus made him independently comfortable. And the large profits from mill or store, in like manner, make it possible to pay high rates of interest for the advances of money which can be turned over many times in a short interval.

These facts at once lead to a considerable expansion of credit operations. Men are so sure of large gain that they take great risks; the fever for speculation sets in, prudence is lost, business becomes a bubble, and bubbles are sure sooner or later to burst. Then comes the retribution: banks and business houses fail, mortgages are foreclosed, credit can no longer be had. Everybody suffers, and everybody seeks desperately for a way of escape.

This is the story that is repeated over and over again in the financial history of all our new States, and the trouble is that it seems so hard to learn from experience. A generation which has suffered passes away, and a new generation takes its place that too often needs apparently in turn to go through the same cycle.

The experience of Kentucky after the depression of 1819 is instructive. Very many people were in debt, notes came due, and assets had vanished, or at least values had largely disappeared. In this emergency the idea began to spread that somehow the State could get people out of trouble if only it would; and the readiest means was to set up a bank—an institution which would issue paper currency and loan it readily, and this paper was to be a legal tender for the payment of all debts. Accordingly, the bank was chartered, the paper printed, and at first it seemed that everything was likely to go on swimmingly. People could get out of debt, after all, and prosperity in time would come back to the State.

But then an obstacle arose. Creditors were not willing to take inconvertible paper in payment of a loan that had been made in specie, and appealed to the courts. The courts sustained them, holding that the State act was a law impairing the obligation of contracts, and hence in conflict with the Constitution of the United States, and void. The paper people were furious at this course of the judges, and in the election of 1824 chose by an overwhelming majority a Governor and Legislature in sympathy with the popular view, and this State government proceeded to legislate the Supreme Court out of office and to constitute another in its place. But, again, the judges were refractory. Holding that their status was determined by the Constitution, and hence was unassailable by any legislation short of a constitutional amendment, they refused to vacate their positions, and appealed to the people for justification. The State election in the following year was fought on this issue, and really meant simply whether the people of Kentucky should adopt the policy of honesty or that of swindling. The canvass was the hottest in the history of Kentucky politics, and, to the everlasting credit of the State, resulted in a decisive victory for good faith. The paper-money party was decisively overthrown; the judges who had dared to decide what was just in the face of popular obloquy were at last sustained by the sober second thought of the people of their State, and the victory was permanent in its results. Kentucky seemed to have learned the lesson once for

all that even a State can not make something out of nothing. The financial policy of the Commonwealth since then has been conservative and eminently sound; no midsummer madness of monetary moonshine has since afflicted it.

In other of the valley States, however, as much can not be said.

The bank question at one time or other played a prominent part in most of the West. During the flush times preceding the panic of 1837, banking charters were freely bestowed, and paper "money" was afloat in great quantities. When the crash came, these banks, having in most cases nothing back of their circulation, of course failed on all sides. Their notes became worthless, and were left on the hands of their unlucky holders.

This dearly bought experience led some States to attempt restriction of legislative power for evil. In the Constitution of Illinois adopted in 1848, Article X, section 3, reads, "No State bank shall hereafter be created, nor shall the State own or be liable for any stock in any corporation or joint-stock association for banking purposes to be hereafter created." And in section 5 it is provided that "no act to incorporate banks shall go into effect unless previously submitted to the people and approved by a majority of the popular vote."

Still, the State bank question was not finally put out of the field of practical politics, so far as issuing paper currency is concerned, until the act of Congress taxing such issues in the interest of the national currency. This made local bank paper impossible.

After the civil war the condition of the agricultural States in the West became very critical. So long as the Government was a large buyer of farm produce, prices were high and the farmer made money; but with the cessation of hostilities this large customer, that was buying property right and left for the ultimate purpose of destroying it, of course ceased to purchase. Prices fell off; commodities were in superabundance; and the farmer began to use for fuel the corn that did not pay to take to market.

The cause of this unfortunate condition of things was not plainly understood. The bondholders were charged with bringing it about; they had bought national bonds at a discount, paying in depreciated greenbacks; and by the act of 1869 these bonds were to be paid in coin, even though they contained no specific stipulation to that effect. This the farmer felt was rob-

bery; and when the Resumption Bill of 1875 became law, added to the act of 1873 providing for the single standard, it seemed still clearer that there was a clique of bankers manipulating the Government for private profit. These considerations led to considerable agitation in the agricultural States, especially in the Northwest, looking toward the restoration of the "people's money," greenbacks, to general use and especially to a legal-tender status. A Greenback Convention at Indianapolis, in 1874, laid the foundation for an independent national party on that issue; and in 1876 a second convention at the same place duly organized such party, and nominated a ticket for President and Vice-President of the United States. A considerable vote was cast for these candidates, especially in Indiana, Illinois, Iowa, Michigan, and Kansas. In 1878 this Greenback party fused with the labor agitators, and in a convention at Toledo formed the "National" party. In the elections of that year the new party cast a million votes, and elected fourteen Congressmen throughout the nation.

In 1880 the convention of this party was held at Chicago, and General James B. Weaver, of Iowa, was nominated for the presiency. He received only about three hundred thousand votes, and the only Congressmen chosen by his followers in the West were from Missouri.

The most recent political movement of dissent from the old parties is that coalition of various phases of dissatisfaction that is now known as the People's party, or Populists. This movement originated among the farmers, who for some years past certainly have not prospered. The cause for this change in the profits of agriculture have been variously assigned. The currency, the railroads, the money-lenders, have all been assailed. Some farmers have thought that copious issues of paper "money" would bring back that prosperity which was so general when, in the war times, paper money was abundant. The railroads have been charged with tyranny, unjust discrimination, overcharging, and virtual monopoly. Without the railroad, of course, the Western farmer would be absolutely helpless. He would be out of reach of a market, and the most abundant crops would be in the main quite useless on his hands. With the railroad he is able to wring money from his soil, sometimes in great quantities. It is only because of steam transportation that the Dakota agriculturist can compete in the Liverpool market with the Russian peasant.

But the same thing that makes the railroad essential to the farmer also puts him quite in the power of the corporation. The power which can make can as easily unmake, or at least can refuse to make; and so, when the hard-working farmer sees his profits evaporating but the railroad growing rich at the same time, he naturally feels that his labor is going mainly to fatten a soulless corporation.

Under this vague sense of injustice, and not always with a very clear idea of how to improve matters, the farmer Legislatures of the agricultural States have now for years been trying to remedy their ills by legislation. The first attempt by any legislature was made in Illinois. The Constitution of that State gave the Legislature power to regulate railroads—a power employed in an act passed in 1871. But this act the courts declared unconstitutional, and the defect was remedied in 1873. This last act provided that railroad rates must be "reasonable," and then established a State Commission to decide what rates would be so. Iowa, Minnesota, Wisconsin, and other valley States, took a similar course.

These commissions have not always been successful. In some cases, notably in Wisconsin in 1874–76, the railroads were by the operation of law deprived of all power to earn any profits at all. They ceased to pay dividends, railroad construction was discontinued, and the development of the State was suddenly checked.

Another cause for the bad times in many sections of Western agricultural communities lies in the peculiar character that farming has assumed of late years in many places. In the early years of the century, indeed until after the civil war, the farmers as a class were looked on as a conservative part of the population. Of late years the most radical measures, in some cases rivaling advanced socialistic programmes, have received their strongest support among some of our Western agriculturists; and the reason for this has been a puzzle.

Still, the explanation is not difficult. In earlier days the average farmer owned his land. If it was mortgaged, it was generally for such portion of its value that he was usually able to carry the interest and to meet the principal. Being a real property-holder, he had a stake in the community, and was averse to radical and unsettling measures. But since the war a new state of things has grown up. The marvelous extension of railroads and opening new lands have caused a rush to get

hold of farms. In some of the early years the crops of wheat and corn were sufficient in a year or two to pay for the farm and its outfit. On the contrary, if there were two or three successive seasons of bad crops, a farmer who was largely in debt would be driven to the wall. But the chance of so large profit was too strong a temptation to be resisted. Many immigrants bought land on credit, usually at a high rate of interest, and stocked it in the same way. They trusted to a few good crops to make them safe. But meanwhile they, in reality, owned nothing except the chance to get a large return; and so speculative an enterprise is hardly legitimate farming. Such venturers lack the frugality, industry, and persistence of the man who has a safe income from his labor, even if his chances of great wealth are small. When seasons are bad, when prices are low, these speculative farmers suffer.

There have been many thousands of settlers, especially on the wheat lands of the Northwest, to whom this description applies. They are rather gamblers than *bona fide* farmers; and when the game has gone against them they have been ready for any reckless measures that seemed to promise a way of escape.

Of course, it will be understood that this description by no means applies to all Western farmers, and probably only to a minority of them.

The "money sharks" have been a real grievance. They have been able to extort enormous rates of interest for small loans in time of necessity; and they have fairly bled the small farmers of some sections of Dakota and Kansas.

Heavily mortgaged farms, lack of thrift, huge rates of interest, crop failures caused by droughts and grasshoppers, crushing rates of freight to the market, these are some of the causes that in the last few years have been making the farmers of many sections of the Northwest and West lose all faith in the wisdom of the old political parties. The immediate relation between grasshoppers and politics it is not always easy to see; but the sufferer can often see what no one else can. And so a new party which professes to be able to remedy the ills of the land finds abundance of recruits. From 1890 to 1892 the new party has elected Legislatures, Governors, members of Congress, and United States Senators. For the first time since 1860 electoral votes in several States were given to the candidates of a third party, and Kansas and North Dakota were of the number.

Another influence that in some of the valley States has trav-

ersed the policies of national parties has been the temperance question. The agricultural States have been inclined to deal rigorously with the saloon. Iowa, Kansas, and the Dakotas have adopted the policy of prohibition, either as a constitutional provision or as a legislative enactment. The enforcement of such laws has been a source of trouble in considerable towns. But the States in question have been peculiarly favored in regard to the issue by the fact that in none of them is found a large city. Prohibition in a farming community and prohibition in a city like Chicago or New Orleans are very different matters.

Minnesota, with two cities of some three hundred thousand people all told, has chosen to deal differently with the question. High license, one thousand and five hundred dollars, and the local option to towns of voting license or no license, is the method in the North Star State. And in the city of Minneapolis there is a further legislative enactment which confines all saloons to the business streets, thus keeping residence sections clear of them. This device of the "patrol limits," as it is called, together with high license, has materially reduced the number of saloons. There are about three hundred in the Flour City.

The people of the valley have dealt with their political problems in the light of such experience as they have been able to get. In general, their fundamental laws have exhibited no great divergence from those of the rest of the Union. As Territories became States, they formed Constitutions modeled on that of the United States and of older States. In general, there is a Bill of Rights, embodying the familiar principles of English and American liberties. Trial by jury, the *habeas corpus*, freedom of speech and of the press, freedom of worship, divorce of state and church, appear in constant repetition. Any peculiar provisions are usually due to some particular circumstances of the community. For instance, the first Constitution of Louisiana, adopted in 1812, provided that no clergyman should be eligible to civil office. There was also a provision that in the Legislature either the French or the English language might be used.

In Illinois the Governor had no real veto power until 1870. This fact went back to the Constitution of Ohio, the first State to be admitted from the territory of the old Northwest. General Arthur St. Clair, the Territorial Governor of Ohio, was in that capacity invested with an absolute veto. Smarting under the recollection of this, and of its very exasperating use by the Governor,

the Constitutional Convention of 1802 gave the Governor of the State no veto power at all.

The States have shared in some general tendencies of constitutional change. The right of suffrage has been extended. Several States have granted the ballot to women at elections for school officials. The judiciary has generally become elective for a term of years, instead of being appointed for good behavior. A vast number of restrictions has been put on the powers of Legislatures, and definite attempts have been made to restrain railroads and other corporations.

All these facts are resultants of the steady spread of democratic ideas, and of the struggle of society to grapple with the new and perplexing developments of corporate wealth that so clearly mark the last decades of the nineteenth century. People have learned also that, on the whole, over-legislation is an inevitable tendency of a legislative body; and so, how to prevent legislation is the study of constitution-makers.

XI. Education.

The settlers in the valley brought with them a fixed conviction that widely diffused education is essential in a republic. A typical small town in the West shows a cluster of low wooden buildings, several church spires, and near the center a substantial brick schoolhouse. Indeed, school architecture in the West compares very favorably with that of the East. There is a very general desire to get the best: improved appliances for heating and ventilation are readily adopted; sanitation and comfort are both heeded. The whole community takes a pride in its school.

But care for education has not depended on the mere varying whims of immigrants; it has been imbedded from the first in the fundamental institutions of the new States. It was a part of Thomas Jefferson's broad conception of the future of American democracy, that the public lands in the Western territory might be made the means of supporting free schools. Accordingly, an Ordinance of Congress was enacted, May 20, 1785, prescribing that in every township of thirty-six square miles, section number sixteen should be reserved "for the maintenance of public schools in said township." This provided an endowment, for the purpose named, of six hundred and forty acres of land in each township. By a further ordinance of July 23, 1787, this reservation was made perpetual.

The *Magna Charta* of the Western States is the ordinance of July 13, 1787, for the government of the "Territory of the United States northwest of the River Ohio." In this ordinance Article III reads as follows: "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." "Encouraged," of course, refers to legislative action for material support; and the initial aid thus given was the reservation by the General Government of the sixteenth section in each township.

As new States were carved out of the Western territory and successively admitted to the Union, the reservation above named was made a condition of the compact, and so the land in question became an educational fund in each State. In 1848 Senator Stephen A. Douglas secured an additional grant of the thirty-sixth section for Oregon and each State thereafter admitted, and this has been given, up to the present time, to thirteen States.

The same ordinance of July 23, 1787, that made perpetual the reservation of section sixteen in each township, also provided "That not more than two complete townships be given perpetually for the purpose of a university. . . ."

This provision also is a part of the compact between each State and the United States; and in accordance with it free State universities have been organized, and are an essential part of the system of public education in these States.

A third provision for public education was made by act of Congress, July 2, 1862, whereby a grant of land was made to each State for the support of agricultural and mechanical colleges. In some cases these institutions are organized in connection with the State universities, in others they are entirely separate.

This system of land grants for free instruction has not only afforded the material foundation for public schools, but has also served to keep the policy of State education fixed beyond any adverse question. And not only that: public education in the West means more than it does in the East. In the West the fundamental idea is that all should have equal opportunities, from the primary school to the university. Free education is not confined to the "three r's." Whoever has the ability and the energy can, if he will, become a university graduate.

Of course, this conception means more than merely fitting all

for the elementary duties of citizenship. It implies opening wide the door of opportunity, so that any who will may enter; it is, if you please, a form of State socialism. But it is thoroughly established, not in the theory of law alone, but consecrated by the action of many years. The State universities have a large plant; they have great invested funds; they have considerable bodies of alumni, exerting—for instance, in the case of Michigan and Wisconsin—already a decided influence on public opinion. The University of Michigan gathers nearly three thousand students, and the University of Minnesota more than half that number.

Such great agencies of the higher education can not fail to give a decided direction to the social activities of the communities in which they are situated; and this state of things is materially different from the educational conditions and tendencies of the older States.

The great scheme of public instruction in the West is not completed by the land grants. Much of these were sold long ago at very low prices, while had they been held till the present time they would be of enormous value. Still, they have afforded large sums, which yield a safe income; but in all cases they are supplemented by taxation, and in not a few instances have benefited by private munificence. It is this union of public grants and individual generosity that will probably afford the safest foundation for permanent prosperity. The magnificent Science Hall which Governor J. S. Pillsbury gave to the university at Minneapolis is quite as significant of the trend of educational progress as the annual tax levy of the several States.

But public education is not the only form that Western schools have taken. Church institutions have been founded in great numbers, and that in all grades; secondary schools, colleges, and theological seminaries are found in every State. Many of these are ambitious beyond their means, using the name "college" or "university" when "academy" would be a more accurate designation. But some of them have won quite solid success; and the present tendency is toward clipping the wings of imagination and making names more nearly correspond to facts.

The great bodies of German and Scandinavian Lutherans and of German and Irish Roman Catholics have given peculiar vitality to the educational institutions of those Churches, and they play a considerable part in the social and sometimes in the political

life of the Northwest. They have amassed large capital, and evidently have "come to stay." The exact relations of public to corporate education will only be settled by time and experience. In no case can there be the difficulty, however, in a free republic, that the same questions have excited in Europe. A "Culturkampf" is quite possible in Germany or France; in America it is out of the question. Still, while church and state are sharply separated in our country, they are likely at times to come into collision. It needs always the wisest statesmanship and the broadest charity to handle and settle such questions.

It has been objected that education in the West is materialistic in its tendency. This, to some extent, is probably true. The mastery of material forces which knowledge gives must appeal directly to people engaged actively in the subjugation of a new land, and it is for this reason that schools of engineering and agriculture have had a great development. Still, learning for the sake of learning is by no means neglected, and is daily assuming a larger place. The increase of wealth and leisure and settled modes of life lead directly to culture in all its forms; and it is a question perhaps worth considering, whether this is not likely to be at least a more virile culture than that which comes from older and less forceful conditions of civilization.

XII. The Outlook.

The future possibilities of the Mississippi Valley are inseparably bound up with those of the republic. As has been said, the valley is the core of the nation. It is in nearly all points typical of the national character and tendencies, and it shares in the action of the great forces that are making our future.

There is no reason to suppose that the vast extent of land between the mountains has yet reached its greatest possible density of population. Great areas, especially of the States west of the Mississippi River, are yet very sparsely settled. The soil can undoubtedly be made to support many millions more of people. If there are forty millions to-day, there seems no reason to doubt that one hundred millions may be found living here in equal comfort a hundred years hence.

But as the population becomes dense there will soon appear the dangers of poverty and misery that are apt to accompany a crowded civilization. The enormous pressure of masses of people seems to crush out the hope and energy and prosperity of a large proportion of them; and the great problem of modern progress,

after all, is how to deal with this tendency—how to prevent the forces of advancing social evolution from being destructive as well as creative.

Of course, it is from the soil that human life is primarily supported. Food and clothing—the elementary necessities of our physical existence—are the products of man's energy applied to the land, and it would seem that the further settlement of the valley must be dependent on the possibility of greatly enhanced profit in agriculture; and it must be confessed that in extensive districts farming is to-day a very uncertain vocation.

But this problem is only one of an intermingled group, the solution of which is a necessary condition of our future industrial prosperity. Methods of agriculture, the relation of means of transportation to commerce, the just incidence of taxation—all these things, and many more, are socio-political questions that the early future must solve; and the fermentation now going on through all the valley States is but a part of the process from which settled conditions will come in time.

The native resources of the valley are only partly developed. Productive soil, mines, water powers, are yet imperfectly exploited, and from their use it seems quite certain that a considerable increase of wealth must come; how large, would be mere guesswork. But a century hence it can hardly be otherwise than that the material resources of the valley will be great beyond the present dreams of the most visionary.

It is true that the economic history of some sections of our country shows a transfer of industrial energy. Agricultural communities become manufacturing; farms become profitless and are abandoned; factories take the place of the plow.

But one reason for this transformation has been the opening of new and rich soils to occupation. The stony hills of New England can not compete with the prairie loam of Illinois and Minnesota.

But the process now going on must soon come to an end. The richest virgin soils are about all taken up; and the agriculture of the future will come, not from the discovery of new lands more adapted by nature for tillage than any yet held, but rather from the application of more productive methods to lands already in use, or to new lands even inferior to much now tilled.

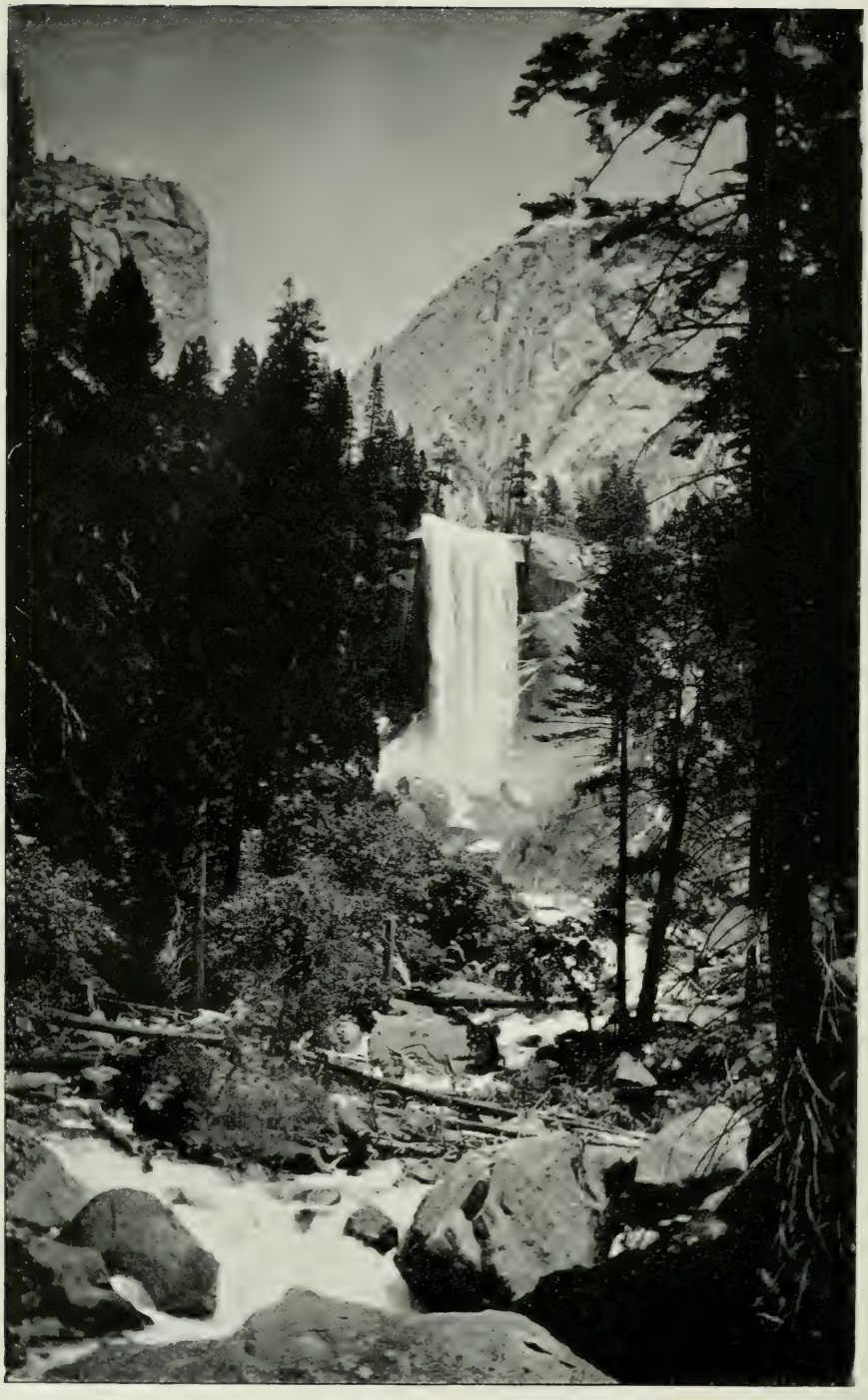
The character of the population that will fill the center of the republic in the twentieth century may be partly conjectural. Still, the present condition of things is one of transition. The

movement of European people to our country has been perhaps the dominant social fact of at least the latter half of this century. With a more nearly equalized condition of life between the Old World and the New—an equilibrium that can not fail to come—this movement will practically cease; and with the lapse of a few generations the foreign character that now marks so many of our citizens will disappear. Differences will fade out; there will be a settling together of discordant qualities, an assimilation to a common type of nationality. It will be the same process which has made one nation out of the various elements once so distinct in France, in Spain, and in England.

It seems possible that this common type which will result from the unification of our population will be in some respects different from any form yet seen. Doubtless the Teutonic idea will predominate. The English shaping of that idea which our history has shown, will continue; but it can hardly fail to get a new coloring from the great continental infusion, and the combination will make a nation rich in peculiarly strong elements. That race idiosyncrasies will not be altogether lost is a matter of course. The descendants of the Pennsylvania German and of the South Carolina Huguenot can still be distinguished, but yet in all essentials they are Americans, and a hundred years hence the denizens of the valley, we can be quite sure, will be Americans in a more positive sense than to-day.

The social and political future of the valley communities will be that of democracy. Democratic institutions are spreading the world around. They are now in the ascendant; but the final judgment of history on democracy will not depend on its vanquishing and displacing other forms of social organization. The question rather relates to the use which the people make of their power. Is democracy calculated to make society better, more prosperous, and happier? To ascertain the answer to this question, we must watch the methods and the success of the democracy in dealing with the complicated relations of modern life. These difficulties, which the opening of a new land has deferred, can not be evaded forever; they must be faced and settled in some way or other. The relation of capital to labor, the status of corporate enterprises, the problems of poverty and crime—all these must be considered. And then there is a higher life—that of refined culture, of literature and art and science, for their own sake. What is the tendency of a democratic society on this form of human development?

These are some of the questions the solution of which the future has in store; and in no other part of the world than in this central portion of North America will the evolution of society in these ways be more interesting to the student of sociology. The material conditions of life and the aggregation of diverse human forces are unique, and the vital energy thus far shown certainly gives rich promise of what is yet to be wrought.



Vernal Fall, Yosemite Valley, California, three hundred and thirty-six feet high.

CHAPTER VI.

THE PACIFIC COAST.

If it be true that to diversity of climate and configuration are largely due the differences in race characteristics and conditions, then should the people of our Pacific shores become one of the most heterogeneous of all the communities on earth. Accepting as the eastern boundary of the Pacific coast the main summit of the Rocky Mountain chain, we find that between San Diego in the south where in 1769 was founded, within a few miles of the present Mexican border, the earliest of the California missions, and the populous cities which, here near the northern limit of our possessions, have sprung up almost within a decade; we find in this region, extending over nearly one fourth of the national domain, almost every conceivable variety of climate and physical structure. Yet in its habitable portions there are no such extremes of heat and cold as occur in other sections of the Union; nor is the coast subject to the hurricanes and cyclones that lay waste at times the settlements of the Western States. To the elevation of our mountain barriers and to the ocean current of the North Pacific are mainly due its exemption from violent tempests and its equality of temperature—the warmth of its winter and the coolness of its summer months.

From the semitropic conditions in southern California, our climate ranges to the temperate in the plateaus of the mountain States and Territories toward the east, and in the valleys toward the north, merging by degrees, in the far Northwest, into the extremes of a New England clime, until in central Alaska vegetation almost disappears under the rigors of an arctic climate. As a rule, the mean winter temperature of the Pacific coast is from 12° to 15° higher than on the Atlantic slope, at points with similar elevation and latitude, the winter warmth conducing largely to the comfort of our people and the progress and productiveness of our industries. The mean average of San Francisco for July is about 58°, or several degrees below that of London and nearly 20° below that of New York, whose mean for July is almost iden-

tical with that of Los Angeles. In the interior valleys of California, where the ocean breezes are but little felt, the summer temperature is from 15° to 25° higher than on the coast, though at times with nearly twice that amount of variation.

In western Oregon and Washington the summers are cool and the winters mild, with but little ice or snow, and with the advantage over California of a summer rainfall. To the eastward we find in the Great Basin beyond the Sierra Nevada an arid region, rich in mineral resources but poor in soil, most of it without vegetation except for sage-brush, and with its scanty rainfall absorbed in brackish lakes. Almost in the heart of the Rocky Mountains are the park system and plateaus of Colorado and New Mexico, where, several thousands of feet above the sea level, are fertile valleys watered by streams replenished by the melting snows from the surrounding ranges. In Colorado the climate is fairly equable; but in New Mexico, as also in Arizona, the extremes are greater, with a variation in the former of nearly 40° between the means for January and July, and with even a wider range in the latter, the mercury always rising, at Tucson, above 90° in July, and in January often falling below the freezing point.

It may be stated in general terms that, in its meteorology, and in part in its flora, the region west of the Sierra Nevada bears more resemblance to western Europe than to the Atlantic slope in similar latitudes, California finding her counterpart in Italy or Spain, and Oregon and Washington in the British Isles; while for some of the transmontane States and Territories we must look for a parallel in the highlands of Persia or Turkistan. In most sections of the coast, but especially in California, the most enjoyable seasons of the year are toward the close of winter and in the early spring, when, as a rule, the temperature is mild and genial, often with cloudless skies, and with hills and valleys carpeted with verdure. In March may be seen, in southern California, orange groves bursting into blossom, side by side with others containing the ripened fruit, and this near the base of mountains whose summits are covered with snow. In May the soil becomes parched; the roads are filled with dust; the flowers and grasses wither; and the landscape exchanges its winter robe of emerald for one of a faded and dusty-brown hue. But whatever the month or season of the year, the climate of California within a few miles of the coast is one of the most equable in the world, permitting active physical exertion almost every day in the year, and without any discomfort.

With its variety and multiplicity of resources, the Pacific coast, and especially its seaboard States, is destined to play an imperial part in history; and above all is this true of California, whose annual yield of gold, though yet reaching far into the millions, has long been exceeded by the products of her farms and factories, her orchards and vineyards, those of the two latter challenging comparison with the fruit-bearing regions of the East, or even of Italy and France. Her commercial situation is also of the best, the northern limit being almost in the latitude of Boston, the southern near that of Savannah, and her metropolis near the line on which stand such commercial centers as St. Louis, Pekin, and Yokohama. Yet, with all its exceptional advantages, this vast region, extending from the Rocky Mountains to the Pacific, is but thinly populated, and, with room for at least fifty million inhabitants, contains as yet less than five million, the average varying from about seven to the square mile in California to less than one in Idaho and Nevada. Allowing for large areas of no present or prospective value, there are still on this coast about two hundred and fifty million acres of agricultural land, of which only a small percentage is under cultivation, with nearly double that extent of pasture land, and of forest. But it is not until recent years that these resources have become known and appreciated. Long after the Golden State had become a great wheat-producing region, a certain well-known Congressman exclaimed in the Senate chamber, "I would not give seventy-five cents an acre for the best agricultural land in California." Today such lands are rated at from one hundred dollars to five hundred dollars an acre, while California ranks among the leading States in the production and export of wheat.

But before proceeding further, it will here be in place to touch briefly on the history of the Pacific coast, and especially on the causes and conditions of its settlement by some of the most enterprising and intelligent citizens of Eastern and Old World communities. Though gold was the magnet that attracted to the farthest West the bulk of its earlier population, and but for the gold discovery, its inhabitants might still be counted by the thousand instead of by the million, years before that event a constant though slender stream of migration was flowing hitherward. At the beginning of 1848 California and Oregon contained several thousand American settlers. In Utah a band of enthusiasts had established a religious oligarchy, which for years bade defiance to

the national Government. In Alaska the Russians had built stations for traders and fur-hunters, with one north of San Francisco at which to barter their furs for provisions. Elsewhere the coast was almost uninhabited, except by savages and savage beasts.

On what may be termed the pastoral era of California it is unnecessary here to dwell. At their missions, extending northward from San Diego, the Franciscan friars dreamed away their peaceful lives, raising goodly crops and herds with the aid of their Indian neophytes, whose labor was requited only with the simplest of food and clothing. Their influence, whether for good or evil, has long since passed away, as did their power, when, in 1833, the missions were secularized, and their property fell into the hands of Mexican officials, the friars hastening to secure their share by selling the hides and tallow of their slaughtered cattle. As for the neophytes, the scanty pittance allotted to them was quickly expended in drinking and gambling. Most of them relapsed into a condition of abject poverty, and not a few into barbarism, they were presently to be hounded and butchered by miners or to perish from the vices and diseases that follow in the train of civilization. The remainder of the population was largely composed of settlers from Mexico, to whom were offered substantial inducements in return for community labor and military service.

Meanwhile a foreign element had been introduced into California, consisting mainly of adventurers from the United States, most of them perfectly aware of the designs of their Government on this portion of the Mexican domain. A momentary occupation of Monterey in 1842 by a squadron under command of Commodore Jones, was followed, some four years afterward by the Bear flag revolt, fostered by the impending rupture with Mexico, and a few months later by the so-called conquest of California. At first this influx of foreigners was regarded by the Mexican settlers with tolerance; but soon the aggression of a superior race aroused them to determined though futile resistance. As to the form of administration under which they lived, they were for the most part indifferent; but when, under a loose system of land tenure and land laws, their estates passed one after another into the hands of unscrupulous lawyers and speculators, then at length their eyes were opened. Compared with the wholesale robbery which now occurred, the spoliation of the missions was but an insignificant raid. By degrees the old Mexican families sank into hopeless poverty, and even of their race, except through foreign intermarriage, few traces remain to-day.

At the Santa Barbara Mission.

At the beginning of 1848 the civilized population of California consisted of some thirteen or fourteen thousand people, about equally divided between the Anglo-American and Spanish-American races, but with a considerable intermixture of elements foreign to either, represented by the native of the British Isles, by the Frenchman, German, and Italian, and by the pure-blooded Spaniard. There were also three or four thousand Christian Indians, leading a semi-civilized life in the neighborhood of towns and ranchos, and there were many bands of savage Indians, whose principal occupation was to harass the settlements, to carry off live stock, and to steal whatsoever came in their way. As to the Anglo-Americans, notwithstanding their ruthless treatment of the Mexican neighbors, not a few of them belonged to the very best class of home-builders. Among them were backwoodsmen from the Western frontier States, with mechanics, farmers, and shrewd practical tradesmen from the Eastern and Middle States, for the most part men of exceptional intelligence, enterprising, self-reliant, and ready of resource, such as would compare not unfavorably with the better class of Argonauts who were soon to follow them in quest not of lands or homesteads but of gold. By these standard-bearers of civilization were introduced many industries and handicrafts new to pastoral California; by them were founded several of her interior towns, and to their agency is due the introduction of such essential features in the westward march of empire as the newspaper and the printing-press.

Such, in brief, are the annals of California prior to the discovery of gold. For ages the land had remained dormant, its primeval solitudes untrodden by the foot of civilized man, its only denizens the dusky savages, almost as brutish as the brutes that shared with them this fair and virgin domain. Then came the Franciscans, and presently we find, within their white-walled missions, sleek and rotund friars living at ease on the labors of their neophytes, but soon to be disturbed by bands of marauding soldiery and greedy officials, whose hand there were none to restrain. The conquest followed, and with it the dawn of California's history, soon to brighten into a radiant sunrise, whose splendor was to be reflected in every quarter of the world.

It was in January, 1848, that the discovery of a few glittering particles in the mill-race at Coloma caused, after a few weeks of pardonable doubt, one of the most profound sensations that the present century has afforded. Then came to these Western

shores a migration such as the world had never witnessed before, and never again shall witness. As the first result, the farms and settlements of California were almost deserted, except by women and children, while stores were closed or left unguarded, so that all might help themselves to whatsoever they contained. From Oregon, Mexico, and the Hawaiian Islands the throng was swelled by crowds of gold-seekers, and before the end of the year there were probably ten thousand miners in the field, by whom were gathered, from a region extending from the Tuolumne to the Feather River, not less than ten million dollars in gold.

Across ocean and continent the tidings were carried, and now the excitement grew apace, fostered by the reports of the more fortunate among the Argonauts, and by the exaggerated statements of sensational newspapers. From the Atlantic States and from Europe the human tide flowed westward in ever-increasing volume, so that before the close of 1849 the ten thousand gold-seekers had increased to more than one hundred thousand, raising California from an insignificant colony into a busy and thriving Commonwealth, her metropolis from a hamlet to a commercial center, and soon after gaining the Territory admission to Statehood without the usual period of probation. Within a twelvemonth more than a thousand vessels entered the port of San Francisco; the fleet of steamers employed on the Panama route was doubled, and in 1851 a cheaper and more commodious passenger service was established by way of Nicaragua. The overland migration began in the spring of 1849, and was continued far into the following decade, adding its yearly quota to the ranks of the pioneers, though thousands who had left their homes in quest of wealth found in the desert nameless and solitary graves.

Except for a few undesirable elements—especially the Mexican and Australian—it is probable that no better class of immigrants was ever assembled on these Western shores than that of which consisted the California pioneers. The very poor were deterred by the distance and cost of the journey; the indolent and timid, the aged and infirm, by its hardships; nor for such did life in the far West, its privations and vicissitudes, present any strong attractions. From all nationalities came their chosen manhood, to people and possess a land whose beauty and wealth, whose resources and prospects were in fitting accord with the character of those who selected it, first as a region in which to gather gold and then as the home of their adoption. In truth, it was a cosmopolitan assemblage, one in which few civilized na-

tions were not represented, in which there were grouped together many heterogeneous elements, in which not the least noticeable features were the youthfulness and vigor, the energy, fortitude, and manly self-reliance of its members. As for woman, her day was not yet, amid the feverish and abnormal condition of society existing in pioneer days. For years the face of woman was never seen in the mining camps; and of respectable women, apart from the wives and daughters of the earlier settlers, there were probably not a thousand in all California at the time of her admission as a State.

In the absence of women there could be no home associations; nor was there anything to bind the Argonauts to the past, for here they found little that was not of their own creation, and for such things they entertained no reverence. Thrown together by the merest chance, and for the most part strangers to each other, strangers often in speech, amid this medley of nationalities there was no foundation on which society could rest. But if society, in the proper acceptation of the word, did not and does not even yet exist in California, there were excellent materials for society. There were men with noble and generous impulses, kind-hearted, charitable, and with a certain rough sociability that was none the less enjoyable for being entirely free from the inane frivolities of fashion. Not least among their distinctive traits was their readiness to join in all measures for the public good, and that from no selfish motives, but solely for the benefit of the community in which their lot was cast. Nevertheless, there was a strong admixture of the criminal element, and even among the better class there were not a few who, no longer their former selves, became perfectly indifferent to the future or the past, giving themselves over to the lust for wealth, and without the least scruple as to the means by which it was obtained.

For several years the mines gave a generous welcome to the gold-digger, whose earnings averaged at least three hundred dollars a month, while there were not a few who accumulated from ten thousand to twenty thousand dollars as the returns of a single season. In 1849–'50 the price of common labor was from eight to ten dollars a day, with mechanical labor at much higher rates. Under such conditions neither agriculture nor manufactures could gain a foothold on the Pacific coast, for there were few articles of general consumption that could not be imported for the merest fraction of what would then be the cost of local production. All that man needed for daily use was imported by sea,

from the miner's shovel to the ready-made storehouse of the merchant. With the varying fortunes of the miners, and with markets often bare or glutted with staple commodities, there followed such extreme fluctuations in prices as had never before been known to the commercial world. In March, 1848, for instance, flour was selling in San Francisco at five dollars a hundredweight, and a month or two later at fifteen dollars, while toward the close of the year it sold at some of the mining camps at more than two hundred dollars. In the winter of 1849 a pair of blankets or boots were worth at Coloma from sixty to seventy dollars; on the north fork of the American River, where were some of the richest placers, five dollars a pound was the usual price for provisions, and at the southern mines a bottle of liquor could not be had for less than twenty dollars. At many points there were no established rates, goods of whatever description selling at whatever the conscience of the shopkeeper permitted him to charge.

But such periods of inflation were quickly followed by severe and prolonged depression, due not only to oversupply but to a woful lack of business judgment. Thus, to a land where there were no women it was not uncommon to forward consignments of female apparel, with silk hats and broadcloth, fine linen and hand-sewed shoes, in place of the *sombreros*, the tweed or leathern suits, the woolen shirts and waterproof boots that formed the conventional garb of the miner. Even such commodities as were needed were shipped without the least regard to the condition of the market, cargo following cargo until, even at auction, their contents became unsalable. Often they were left to rot, in company with the deserted vessel that brought them into port, or were cast forth as worthless from crowded warehouses to be used as pavements for street or sidewalk, merchants passing to and fro over bales and boxes of goods, for which they had attempted in vain to find a market. Gradually, however, as passed away "the good old days of '49," commerce assumed a more normal aspect.

From about forty million dollars in 1849, the production of California gold increased to its maximum of sixty-five million in 1853, this increase being due less to new discoveries than to improvements in methods. It was in this year that the hydraulic process was invented, whereby the cost of extracting the gold from a cubic yard of gravel was reduced from several dollars, as in the days of the pan and rocker, to a few cents. Quartz mining had also been introduced, though at first with meager results

Virginia City, Nevada, in 1876.

and many a disastrous failure, due to expensive processes and lack of experience. Meanwhile more attention had been given to agriculture and stock-raising, California becoming almost self-supporting as to her supply of cereals, and a few years later exporting wheat and flour. Thus was inaugurated a new era in the industrial conditions of the State.

With the decadence of mining, business sought other spheres of operation, and with a steady growth of industries and population the State continued to prosper, though with occasional setbacks, as during the Frazer River excitement in 1858, when a wholesale exodus to the gold fields of British Columbia reduced for a time by nearly one half the values of real estate. The civil war gave a decided impulse to the commerce and industries of the coast, and especially to her manufactures, which were concentrated mainly in San Francisco as the commercial center, and as the point at which supplies of raw material could be most readily and cheaply obtained.

Beginning with 1860, the mines of Nevada, and especially of the Comstock lode, whose shares were largely owned in San Francisco, poured forth a steady stream of wealth, adding within less than two decades about three hundred million dollars to the world's stock of the precious metals. To the coast, however, they were of doubtful benefit, engendering as they did speculative manias which affected all classes of our citizens, followed by the inevitable collapse, during which thousands suffered financial shipwreck, the savings of a lifetime being swallowed up almost in a day. But such lessons were not lost, and within recent years a noticeable feature has been the absence of speculation, whether in mines or realty or articles of commerce, except for a brief period of real-estate inflation at a few points in southern and central California.

Within the past decade then has come to this State a new and most desirable class of immigrants, not of adventurers for gold or of speculators in vacant lands, but of men and women of means, and with the culture and refinement characteristic of Eastern communities, to make their homes in a land whose attractions are the brightness of its skies, its health-giving atmosphere, and its fertile and adaptable soil. Coming as they did from our leading centers of civilization, they have brought with them the foremost ideas in science, art, and morals, giving tone and character to our Western society, cast as it is in a coarser mold, one in which gold is above all things supreme, in which the pride of

wealth has almost overshadowed all higher and worthier aspirations.

As to the present condition and prospects of California, it may be stated that she has entered on a career of substantial prosperity, due mainly to the unfolding of her agricultural and manufacturing resources; that the present cycle promises to surpass all others in whatever may tend to the welfare of the State. It is, indeed, a wonderful development which, almost within the span of a single generation, has occurred in this farthest West. There are men still living who remembered the time when two or three cargoes a year of hides and tallow, exchanged for provisions and clothing, represented the commerce of the Pacific coast; while to-day its metropolis ranks among the busiest seaports in the Union, with exports and imports almost equal to those of Philadelphia, the fourth in rank among our commercial cities. More than ninety per cent of the imports of the Pacific coast, and about eighty per cent of its exports, pass through San Francisco, and before the building of overland railroads she controlled even a larger share of its trade. Between 1860 and 1890 the foreign commerce of the coast increased from $12,350,000 to $96,354,000, or six hundred and eighty per cent, while that of the United States increased from $687,192,000 to $1,647,139,000, or one hundred and forty per cent. In 1858 the foreign imports of San Francisco were about $9,000,000, increasing to $49,000,000 in 1880, and were for the entire State $52,500,000 in 1891. Exports of California produce for 1890 included 650,000 tons of wheat, 4,000 carloads of oranges, 80,000 tons of other green and dried fruits, and more than 4,000,000 gallons of wine. The results which in older communities have only been reached by centuries of persistent toil, have here been attained by boldness and comprehensiveness of plan and by superior executive skill. Whatever may be said against California as to her want of thoroughness in business and farming methods, it can not be denied that here have been witnessed some of the greatest achievements in the nation's industrial career. Turning to account all the lessons gathered from the storehouses of human experience, and often applying them in new directions, every source of production has been tested and utilized, and with the result that to-day the State ranks among the first in the Union in wealth per capita, her industries expanding with marvelous rapidity, her commerce extending throughout the Western shore of the continent, and her products borne to the commercial centers of either hemisphere.

Above all things, California is the land of great achievements, and if also of great pretensions, there is at least something to back those pretensions. Here are to be found some of the largest wheat farms in the world, with shipments of twenty thousand to thirty thousand tons of wheat by single individuals as the proceeds of a season's crop. Here are some of the largest stock and dairy farms, with many thousands of cattle grazing over a surface wider than many a European principality. Here are vineyards, orchards, and orange groves covering a total area of more than three hundred thousand acres, and with an average yield of at least one hundred dollars an acre. Here are some of the largest hydraulic mines and the greatest mining machinery to be found in the United States, and with rare exceptions, in any country in the world. And yet all that has been accomplished within the four decades of our existence as a State is but a foretaste of what may come to pass when there shall be toilers enough more fully to develop our resources and consumers sufficient for our products.

Little more than twoscore years have passed since the metropolis of the Pacific coast consisted merely of a group of cabins and tents, covering the narrow space that lay between the waters of the bay and its adjacent sand-dunes. To-day San Francisco is a city of more than three hundred thousand inhabitants, extending westward from the shores of the harbor to the shores of the ocean, and southward beyond the point where, in Argonaut days, the only wagon-road passed through miles of drifting sand. Here are residences and business structures, hotels and theatres, churches, schools, and libraries, such as would be no discredit to the commercial seaports of the East, with a trade represented in 1891 by nine hundred million dollars as the operations of its clearing-house, with manufactures of at least one hundred million dollars, with bank deposits of more than that amount, and with transactions in realty for the preceding year of nearly forty million.

That San Francisco has a great future before her is almost beyond a peradventure, for here is the only good harbor on a coast line of nearly a thousand miles, the natural outlet for the products of a vast tributary region, the natural distributing point for several of our States and Territories, and with an established and increasing trade not only with the East and with Europe, but with Spanish-American countries, with China and Japan, with the Hawaiian and Philippine Islands, with Australia and

New Zealand, and even with British East Indian ports. Apart from one or two interior cities whose location, almost in mid-continent permits no just comparison, there are none that can hope to supersede, as a commercial emporium, the city by the Golden Gate. Doubtless the commerce of the coast will, year by year, be more widely distributed among inland and seaport towns —such towns, for instance, as Sacramento and Stockton, as San Diego and Los Angeles, as Portland and Seattle; for here, as on the Atlantic seaboard, the course of trade tends strongly toward such division of traffic. But in this age of "booms" there are scores of so-called cities whose denizens would have us believe that they are destined ere long to outstrip San Francisco, as though the mere grouping together of an ambitious community, the fictitious valuation of real estate, and the erection of a few costly buildings in mere anticipation of trade, would establish a mart of commerce or transform a village into a metropolis. As to such pretensions no further remarks need here be made.

Before turning to other sections of the coast I will touch briefly on the political annals of California, together with such kindred topics as may serve to display some of the distinctive features of the community.

Among Californians, and especially among her Argonauts, self-reliance was ever a prominent feature, finding expression not infrequently in impromptu organizations, whether for enterprises of common benefit or for purposes of government. Essentially of a practical turn of mind, they had recourse, when need be, to fundamental principles, accepting the will of the people as superior to precedent, and the voice of the people above established laws, framing for themselves such regulations as circumstances might at the moment dictate. While busied with mining and trafficking, they gave but little attention to political and judicial administration, until, shielded by those in office, crime stalked abroad in our midst unpunished and for a time unheeded. But presently, in 1851, and again in 1856, the anger of the community was roused, and by our so-called Vigilance Committees, organized in each of these years, several of the more dangerous criminals were hanged, and others were exiled or terrified into flight. In other portions of the State committees were formed, and soon this moral pestilence was abated throughout the land, honest men breathed more freely, while those who were dishonest were convinced that here was no longer a field for their rascality. In

the action of these committees there was nothing approaching to mob law. Their members had no desire to break the law, but to enforce its execution, to give to society the protection which our law courts no longer afforded, to rid the State of the shame and sorrow caused by a corrupt administration of justice. As one of the results, a reform party was organized which for many years gave to us the blessings of an honest government, and the example set in the metropolis was followed elsewhere with most beneficial results.

The recent labor strikes and disturbances in the Eastern States find a parallel in the anti-Chinese outbreaks which have occurred at intervals in various portions of the coast, and especially in its metropolis in 1877–'78. Doubtless the times were hard, with low wages and lack of work, with many of our factories closed, and with commercial and industrial enterprise in a languishing condition. Hence the cry against the Chinese, to whom, as also to the capitalist, the mischief was attributed. About this time occurred the great railroad riots of Pittsburg and elsewhere in the East, the spirit of disorder finding its way across the continent and settling on San Francisco. A number of Chinese laundries were demolished, and an attempt was made to destroy the docks of the Pacific Mail Steamship Company, in whose vessels the hated Mongolians were brought to our shores. And now again was roused the spirit of the Vigilance Committee, five thousand men being enrolled within forty-eight hours, and companies of armed citizens patroling the streets, until, after the loss of several lives and more than five hundred thousand dollars in property, order was finally restored. While labor strikes have not been infrequent, they were seldom attended with violence, and it may be said that the relations between employer and employed have, as a rule, been satisfactory. With the high rates of wages here prevailing, and with a climate that permits outdoor work almost every day in the year, the mechanic and laborer have little cause to complain of their condition.

Mainly to the Labor party was due the adoption of the new Constitution, which on the 1st of January, 1880, became the organic law of the State. By the business community many of its provisions were regarded as fraught with serious mischief. It was largely directed against capital; it placed too many restrictions on legislation; introduced new and dangerous elements into the judiciary; favored non-resident property-holders in its system of taxation; placed in the hands of commissioners the control of

railroads, with power to establish rates. In a word, it attempted too much; was wanting in clearness and precision, and whatever it proposed to effect could have been better accomplished by amendments to the Constitution of 1849, largely founded on those of Iowa and New York. The more objectionable features in this instrument became, however, largely inoperative, and many of them would not even stand the test of the courts. With the political records of California we are not further concerned, for in her more recent annals there is nothing of special interest. Suffice it to say that the day has not yet arrived when, as the better class of our citizens hope, her political condition shall be on a level with her material greatness.

Turning to Oregon and the Northwest we find there one of the most steadily prosperous communities on the Pacific coast, and with a future the greatness of which no man can foretell. With her vast extent of fertile soil, her immense deposits of iron and coal, her boundless forests, containing merchantable timber of many varieties, her hundreds of miles of navigable inland water, her abundant water power furnished by streams that neither fail nor freeze, with all her manifold resources, it may indeed be said that Oregon is yet only on the threshold of her career. Within a decade her population has almost doubled, and, should this rate be maintained for half a century to come, the area of unoccupied land would still furnish homes for many hundreds of thousands.

Originally a mere game preserve of the Hudson Bay Company, the acquisition of Oregon and Washington by the United States was due to her missionaries and pioneer settlers, but for whom it is probable that England would have made good her claim to the entire territory. In the response to the request of certain Flathead chiefs, missionaries, sent forth by the Methodist Board in 1834, established in the Willamette Valley the first of their stations in the Northwest. Others followed of various denominations, and, attracted by their favorable reports, a tide of migration set in a few years later, increasing steadily in volume, until, in 1845, several thousand settlers began to dispute with the fur company the possession of their domain. Then followed the boundary question with its international complications, finally settled by England's acceptance of the forty-ninth parallel as the southern limit of her possessions.

Admitted as a Territory in 1848, and as a State in 1859, Oregon developed rapidly under American institutions, and in no

A street in the Chinese Quarter, San Francisco.

small degree was this development due to the tone and character of her legislation, and of those by whom her laws were framed. With rare exceptions these laws were well considered and beneficial, and seldom were they vexatious, sitting so lightly on the community that their yoke was barely felt at all. In her halls of legislation are rarely witnessed such unseemly altercations as elsewhere appear to be inseparable from the functions of our lawgivers. Nor is the time of the members devoted to frivolous discussions, or to the discussion of measures which are either useless or injurious. In a word, Oregon is one of the best governed of all the States, as is shown by her moderate rates of taxation, her freedom from debt, and the soundness of her financial condition.

As to the people themselves, they have ever been noted as a most thrifty, industrious community. The earlier settlers were compelled to labor in order to live, many of them, after losing their effects in the journey across the plains, arriving in an almost destitute condition, and, their own necessities relieved, extending to others the assistance afforded to themselves. Presently began her era of prosperity, her farms and orchards yielding abundantly, while for their products a ready market was found in California for many years after the gold discovery. In due time manufactures added their quota of wealth, Oregon now ranking second among the Pacific sisterhood of States. To the Northwest has come a most desirable class of immigrants, one whose social advancement has been fully in keeping with their material progress. If at first somewhat tardy in the development of her resources, Oregon has advanced with a steady and permanent growth, justifying the oft-quoted saying applied to her pioneers, as to the Pilgrim fathers, "They builded better than they knew."

In 1848 the present city of Portland consisted merely of a few log cabins, with here and there a frame building, and at most half a dozen stores whose trade extended only to the plains a few miles toward the south. Five years later her population numbered less than two thousand, and it was not until long afterward that commerce in its proper sense existed in the Northwest. In 1880 Portland contained about twenty thousand inhabitants, and with a volume of business that would have furnished a respectable average for double that number. From thirty million dollars in 1880 her wholesale trade increased to nearly one hundred and forty million in 1890, at which date her population was somewhat less than forty thousand, her commercial transactions thus showing the remarkable average of twenty-eight hundred dollars

per capita. Nor has this growth been brought about by forced or speculative movements, but rather by legitimate enterprise and by the unfolding of natural resources. Even yet the commerce of Portland is almost in its infancy, the lack of capital preventing her merchants from availing themselves fully of the openings presented by the vast region of which she is the natural *entrepôt.* With advantages equal, and in some respects superior, to those of San Francisco; with three transcontinental thoroughfares centering within her limits, each under separate control; with local roads opening up a vast and fertile area extending from northern California almost to the borders of British Columbia; with a harbor whose entrance is not obstructed by dangerous currents or rock-bound shores, and one that, except for the Golden Gate, brings the producer and consumer nearer together than any on the Pacific coast, it may safely be predicted that the metropolis of Oregon will attain to a prominent rank among the commercial centers of the United States.

And yet Portland is not without rivals for the rapidly increasing traffic of the Northwest. In Washington the recent growth of her commercial cities is one of the most remarkable phenomena in the history of the coast. In 1870 the population of Seattle, founded nearly twenty years before, barely amounted to one thousand, increasing during the following decade to about thrice that number. In 1890 it was more than forty thousand, with a commerce estimated at thirty-five million dollars, and with real-estate transactions of twenty-three million dollars, the latter almost equal to those recorded in San Francisco with more than seven-fold her population. In 1887 Tacoma contained but a handful of inhabitants, and had long been known as one of the most dormant of our Northwestern settlements. In 1890 its population numbered thirty-five thousand, with a large volume of commerce and manufactures, the Northern Pacific Railroad here making connection with ocean steamship lines, and with coast steamers operating from San Francisco to Sitka and many intermediate points. At Spokane Falls the only human habitations in 1875 were the wigwams of some roving band of Indians; in 1890 it mustered nearly thirty thousand inhabitants, having more than doubled its population, its trade, and aggregate wealth within the space of a twelve-month.

There are few sections of the Pacific coast whose development as to increase of population, industries, and commerce has been more remarkable than that of Washington. As late as 1870 her

inhabitants numbered only twenty-three thousand, consisting mainly of settlers and miners from Oregon and California. In 1890 there were nearly three hundred thousand people within her borders, thus showing a twelvefold gain within a score of years. Already the State is a large exporter of raw and manufactured products, consisting mainly of lumber, coal, wheat, and hops, together with salmon shipped from the canneries on the Washington side of the Columbia River. Considering her agricultural and mineral resources, her manufacturing facilities, and her safe and commodious harbors, affording ample room for a vast commercial marine, it is probable that the trade of this section will form a steadily increasing factor in the commerce of the coast.

Of all our Western business centers the only one that bids fair to wrest from San Francisco her commercial supremacy is the city of Denver; and yet, with the vast region tributary to each, their interests seldom come into serious competition. Though an insignificant trading-post long after San Francisco had become a thriving and populous seaport, the relative progress of Colorado's metropolis has been more than on a par with that of the city by the Golden Gate. In 1859 the former consisted merely of a few one-story dwellings, mud-roofed, and built of cottonwood logs, fringing the bank of Cherry Creek near its outlet into the Platte. There was not a pound of nails in the entire settlement, and there were not half a dozen windows of glass. In the summer months the floors were of earth, and in winter of mud, the roofs retaining so much water that, as the saying went, "it rained inside for days after it had stopped on the outside." In 1890 Denver contained at least one hundred and twenty-five thousand inhabitants, with hundreds of costly and tasteful residences and business structures, with a trade of more than one hundred and forty million dollars, and transfers of realty exceeding forty million dollars, the latter considerably in excess of those reported in San Francisco, and with substantial improvements either completed or in prospect. Here was the commercial and industrial center of one of the wealthiest States in the Union, and here its railroad center, with three of our overland lines passing through its suburbs, and with branches extending to all the principal mining and agricultural districts.

Nowhere else on the Pacific coast can be found a more intelligent, cultured, and thriving community than exists to-day in Colorado. As with most of our States and Territories, gold was the incentive that first attracted population. In 1859 the Pike's

Peak excitement drew there a hundred thousand gold-seekers, of whom, before the close of the year, more than one half returned in disgust, while other thousands already on the way were deterred by the discouraging reports of these baffled fortune-hunters. But those who remained were among the most enterprising and resolute of our Western pioneers, the very men required to lay the foundations of this young and ambitious Commonwealth. By them the mines were discovered and worked, her settlements established, and the basis laid for agricultural development. Commerce and manufactures followed, and by the construction of irrigating canals, doubling as well as assuring the crops, a new impetus was given to agriculture, while stock-raising became an important factor in the industries of the State. Within recent years Colorado has entered upon a career of substantial prosperity, largely due to the steady influx of Western farmers, to whom one of the main inducements is an elaborate system of irrigation, watering an area of from two million to two million five hundred thousand acres, of which more than one half is already under cultivation.

In 1876 Colorado assumed the functions of Statehood, unincumbered by debt and with a judicious and honest administration. As a rule, her Governors and officials have been men of character and ability, and in Congress she has for the most part been represented not only by men of wealth, but by men of integrity and strong individuality. If, at times, adverse criticism has been justified by the misapplication of public funds, or by land and railroad monopolies, such grounds of complaint have existed and still exist in other sections of our coast. Monopoly has at least been held in check by the banding together of the working-classes, often enforcing compliance with their demands, and seldom failing to secure the rights to which labor is justly entitled.

With her fertile valleys and plains, with the nutritious pastures of her mountain slopes, with her vast and yet almost virgin mineral resources, and with railroads constantly bringing nearer together the producer and consumer, it needs no prophet to foretell the future greatness of Colorado. Already are represented among her citizens some of the choicest elements drawn from Eastern and old communities, men of means and culture, many of whom, finding relief from their maladies in her bracing mountain atmosphere, have here selected their future home. Among all classes will be found an unusual degree of ability, and nowhere, perhaps, a larger proportion of educated men, nowhere a brighter

example of what may be accomplished in so brief a period by the intelligence and enterprise of man.

Of our Pacific States and Territories, California, Oregon, Washington, and Colorado have already attained to prominence in those two branches of employment without which no solid prosperity can exist—agriculture and manufactures. In all, the mining output has long been exceeded in value by the product of farm and factory, while year after year the latter add more largely to the volume of their wealth. Except perhaps for Utah, mining and stock-raising are the leading pursuits in the remaining divisions, though, under the stimulus of irrigation, the culture of cereals and fruits is being more rapidly developed. Of each one mention will be made in connection with its industrial and social conditions, and first of all as to mining, without which would never have occurred the several emigrations which have peopled our Western domain.

It should be stated that in most of our Pacific States and Territories placer mining is a thing of the past, having long since been superseded by quartz and hydraulic mining. In California the gold region is found among the foothills and slopes of the Sierra Nevada, and is intercepted by river beds and cañons, with a ridge of granite running through its center, and on its sides layers of metamorphic slate. North of the American River the gold region covers almost the entire slope, narrowing toward the south, beyond Mariposa County, and again reappearing in conjunction with granite. The "mother lode" has been traced for more than sixty miles, with other veins varying in width from a thread to twenty or thirty feet.

Gold-bearing gravel deposits are found in the beds of rivers long since filled up, one of the largest and most remarkable being the Dead Blue River, some fifty miles east of the Sacramento, and so called from the color of its sands. For many years hydraulic mining was carried on throughout the region extending about two hundred miles northward from Mariposa County, the deposits varying in breadth from one hundred to two thousand feet, and in depth from a few feet to one hundred yards. Drifts are run to tap the richer portions, and elsewhere they are worked by washing down the banks by means of hose and nozzle; a nozzle nine inches in diameter throwing a stream with a velocity of one hundred and fifty feet a second. Hydraulic mining is somewhat destructive to agriculture, the refuse from the gravel bank and mills gradually filling up the beds of rivers, obstructing naviga-

tion, and forcing their sand-laden waters over the adjacent lands. By statute, in 1884, such mining was forbidden where in conflict with other interests, and to this was largely due the decrease in California's output of gold to ten million dollars in 1890, though increasing considerably in the following year with the opening of new mines and the closer working of ores.

Of late, scientific mining has largely extended the area of operations, giving value to what was before considered as worthless ground; while Californian inventions have wrought a revolution in milling and other processes, reviving this branch of industry in many an abandoned camp, and elsewhere on this coast opening new fields of enterprise.

To mining, and especially to the Comstock mines, Nevada owes her existence as a State—a community at one time the richest on the Pacific coast, springing up in the desert, through the discovery of vast ore deposits. Apart from her mining camps she contains but a scanty population, scattered throughout her more fertile valleys, and with stock-raising as the leading industry. From the Comstock lode about two hundred and fifty million dollars of gold and silver had been extracted, with dividends of more than one third of that amount, and with an annual yield varying from two million or three million dollars in 1862 to some thirty-two million dollars in 1876, and gradually dwindling to less than three million dollars for 1891. With the changing fortunes of the mines came violent fluctuations in the prices of their shares, attended with periods of speculative mania and collapse—the stock of the Consolidated Virginia mines selling, for instance, at over seven hundred dollars in 1875, and for a few cents in 1886. The absence of mining speculations of recent years has greatly tended to the welfare of the coast, and especially of its metropolis, where in former years men often risked and lost their all on the fortunes of the mines.

On the Comstock lode, though at present with but a comparatively slender output of the precious metals, are still at work some of the heaviest mining machinery and largest quartz mills in the world, the main shaft of the Consolidated Virginia engine weighing fifteen thousand pounds, and with a fly-wheel eighteen feet in diameter. A feature in the timbering of the mines is the so-called crib system, invented by Philip Deidsheimer, whose plan was to construct the framework of timbers in "sets," which, built up one on another and with the intervening spaces filled with waste rock, served to sustain the downward and lateral pressure. By

The Columbia—View taken at the foot of Mount Hood.

the Sutro Tunnel, more than three miles in length, and tapping the lode at a depth of sixteen hundred feet, the mines are partially drained by water; ventilation is improved, and from some of the mines ore is conveyed to the mills.

Among the mining districts in Nevada are those of Eureka, Pioche, White Pine, and Cortés, only the last of which is now producing largely. New discoveries are, however, being made from time to time; and as to the Comstock lode, while many predict the near exhaustion of its ore bodies, the same prediction has been made a score of times before, and as often falsified by fresh developments.

In Oregon, beach mining is conducted at various points on the coast from the Columbia River almost to the California border, especially at the mouth of the Coquille, where are large deposits of gold-bearing magnetic sands. In eastern and southern Oregon, as also in Washington, are a few quartz mines yielding fair returns, but the mineral wealth of both consists mainly of their coal and iron deposits, of which further mention will presently be made. In the Cariboo, Cassier, and other districts in British Columbia, extending from Vancouver Island to the Rocky Mountains, placer mining is still conducted to a limited extent, among alluvial deposits brought down by streams whose source is in the Rocky and Cascade ranges. The lack of good roads retards development, especially of quartz deposits, which must be exceedingly rich to tempt the investment of capital in this remote and isolated region. On the banks of the Frazer are extensive terrace deposits worked by sluice and hydraulic operations. The opening of the Canadian Pacific Railway has tended to create a revival in mining, though in 1890 the total yield of the province was less than sixty thousand dollars. On Douglas Island, in Alaska, is one of the most productive gold mines on the coast, yielding at the rate of one million dollars a year, and paying handsome dividends from an ore body of vast extent, though averaging only four to five dollars a ton. On the placers in the valley of the Yukon a few hundred miners make fair returns during the brief summer season. For 1891 the total yield of Alaska gold was estimated at more than two million dollars, of itself a fair return on the seven million two hundred thousand dollars paid for a Territory which, except for its peltry and fish, was supposed to be void of resources.

Idaho produced, in 1890, about eight million dollars in silver and three million dollars in gold, together with ores and base

bullion valued at seven millions. The State is extremely rich in minerals, and with better facilities for communication her resources in this direction alone would sustain more than her present population. In Montana, which has been termed the home of gold, the precious metal is found in so many different geologic formations that it would almost appear to have been manufactured by Nature without regard to the material at hand. It is found in alluvial drifts, in beds of ferruginous conglomerates, in quartz, granite, and hornblende, in micaceous slates, and in other igneous and metamorphic rocks, its matrix not infrequently being found in iron and copper. Silver is also abundant in the form of chlorides and sulphides. During the decade ending with 1890 Montana yielded one hundred and seventy million dollars in bullion, and in that year claimed the largest gold mine, the largest silver mine, and the largest copper mine in the United States.

In Utah gold and silver mining were long discouraged by the Mormon hierarchy as a demoralizing industry, and threatened an influx of the Gentile element. In 1883, however, there were at least a hundred mining districts in operation, yielding from five million to six million dollars a year, though with a few exceptions it can not be said that they were profitable. The average yield of galena ores, of which consisted the bulk of the deposits, did not exceed thirty dollars, against an outlay of nearly forty dollars for mining, hauling, smelting, and refining. In Wyoming there is a large number of quartz, hydraulic, and placer mines; but their ores are of low grade, and to other resources, especially to her coal, iron, and copper, the State must look for her mineral development.

In Colorado, probably one of the oldest portions of the North American continent, Nature has stored an abundance of her treasures within its mountain walls, and in the formation of the remarkable strata here existing her laws would seem to have been varied, accident alone affording the clew to mineral wealth. Gold is found in a great variety of formations, and often in refractory combination with other metals. No less eccentric in character are the silver deposits, which are sometimes found in horizontal or so-called blanket veins, separated by strata of barren rock. The maximum yield of precious metals of the State was attained in 1882, and after declining for several years thereafter stood in 1890 at thirty-one million dollars, including, however, a large percentage of base bullion. At the latter date Leadville still retained the prominence acquired in early years, and, except for the Com-

stock lode, the output of this famous district has probably never been excelled by any mining camp on the Pacific coast.

In New Mexico, the silver mines worked by the Spaniards about the middle of the seventeenth century were abandoned before its close. From the opening until near the middle of the present century gold mining was also conducted on a limited scale; but it was not until after the civil war, when a large migration occurred in this direction, that any great progress was made. From about two hundred thousand dollars a year, for the period of 1865–'70, the average yield of gold and silver increased to four hundred thousand dollars for 1875–'80, and to nearly four million dollars for 1885–'90. As depth is reached, the ores become refractory, and expensive machinery is needed for their reduction; but when certain retarding conditions are removed, such as faulty methods and lack of capital and transportation facilities, New Mexico will probably attain to a prominent rank in her production of the precious and other metals.

In Arizona, the discovery of the Bolas de Plata mines in 1736 inaugurated her mining industries, silver deposits being found of wonderful richness, containing masses of almost pure metal several hundred pounds in weight. After that date mining was continued at intervals as the cessation of Indian wars permitted; but when New Mexico passed into the possession of the United States, not a single mine was being worked. In 1777 the discovery of the famous Tombstone mine led to an era of prosperity, its yield up to 1886 being estimated at thirty million dollars.

Coal, iron, copper, lead, cinnabar, and petroleum are widely distributed throughout the Pacific slope. In California, though coal is found in many of her counties from the coast to the foothills of the Sierra Nevada, it is for the most part of inferior quality, and in seams too narrow to pay for working. The only large veins thus far developed are those on Mount Diablo, within a few miles of San Francisco Bay, from which, since 1855, have been extracted from fifty thousand to one hundred and fifty thousand tons a year, used mainly as a steaming coal, and half bituminous in character. Oregon contains throughout her Coast range numerous veins of coal, but in broken strata, much of it being classed as common lignite. Though in some of the counties more valuable deposits exist, the only beds at present largely worked are in the neighborhood of Coos Bay, whence in 1855 the first cargo was shipped to San Francisco. The coal is of fair quality, and in quantity almost inexhaustible.

In Washington it is estimated that there are within fifty miles of tide water nearly two hundred thousand acres of coal lands, the products of which can be mined and placed on board ship at a cost of less than two dollars and fifty cents a ton. Up to 1890 the total output exceeded three million tons, of which nearly one half came from the Newcastle mines, a few miles to the east of Seattle, with others on Cedar River, Bellingham Bay, and elsewhere, producing largely, and steadily decreasing our foreign imports. British Columbia is also exceedingly rich in coal, and from the Nanaimo mine, on the southeastern coast of Vancouver Island, originally purchased from an Indian chieftain in exchange for a bottle of rum, was taken in 1851 the first coal produced on the Pacific coast. From this mine have since been shipped in a single year three to four hundred thousand tons. In Colorado there are coal deposits in almost every county, and of immense extent, the most valuable being the anthracite areas in the southern portion of the State. In 1886 the yield was valued at six million dollars, increasing in later years with the growth of her population and manufactures.

Often in the vicinity, and at times in conjunction with the coal measures of the Pacific coast, are found its largest iron deposits. In California the only productive mine, named the Clipper Gap, is in Placer County, with a capacity of fifteen thousand tons a year, and with extensive deposits of limonite and magnetite ores, containing from fifty to seventy per cent of iron. In Oregon, though with a vast extent and variety of rich and accessible veins, the yield is also limited to a single mine near the town of Oswego, on the west bank of the Willamette River, where there is a vein of brown hematite from six to twenty feet in thickness, and yielding about forty per cent of metal. In Washington, the largest deposits are in the so-called Iron Mountain, near Snoqualmie Pass, with magnetite veins from a few feet to a hundred and fifty feet in thickness. Bog-iron ore is also plentiful, the Chinacum mine, near Port Townsend, having a stratum two feet thick, covering an area of six hundred acres, and yielding about fifty per cent of metal. On Texada Island, in the Gulf of Georgia, is a fissure vein eighty feet wide, whose output is of excellent quality. In a single county of Utah, named after its iron deposits, it is estimated that there are fifty million tons on or near the surface, assaying about sixty per cent, but thus far little utilized on account of the limited market and the scarcity of coking coal. In Colorado the production of iron and steel was valued in 1886 at three million dollars, and

Eastern slope of Mount Shasta, California.

since that date has largely increased. In Boulder County are the most extensive works, and in Chaffee County, the richest mine with magnetic and hematite ores, producing seventy to eighty per cent of metal. In Nevada, Idaho, and Montana are also valuable but as yet untouched deposits.

Though copper lodes exist in many sections of the Pacific coast, the only one extensively worked is that of the Anaconda mine in Montana. Of lead, the largest producers are Nevada, Utah, and Colorado, for the most part in connection with silver mining. Of cinnabar, the most valuable mine is the New Almaden, in Santa Clara County, California, producing between 1854 and 1880 more than fifty million pounds, and since the latter date with a continuous though smaller yield. Other California mines have been fairly productive, and elsewhere on the coast are deposits awaiting development. In Nevada, nickel and antimony mines are being worked to a limited extent; in Utah, mica is produced; and in Wyoming, plumbago, graphite, and asbestos. On the banks of Clear Lake, in California, is found a merchantable quality of sulphur; and from a tract of borax lands in San Bernardino and Inyo counties there is an annual yield of some twenty-five hundred tons. Petroleum is widely distributed, with the most productive wells in California and Colorado yielding from fifteen million to twenty million gallons a year.

Such are the leading mineral resources and mining industries of the Pacific slope, and except for the precious metals these resources are as yet but slightly developed. With an abundance of coal, iron, and copper at our very doors, we still import largely from the East or from England of all these commodities, and for our supply of tin depend mainly on Australia, with but a single tin mine on the entire coast, producing in southern California at the rate of a few hundred tons a year.

Let us now turn to agriculture, which in most of our Pacific States and Territories was the handmaid of mining, acquiring no permanent foothold until years after the latter industry had peopled our shores with gold-seekers. As an agricultural region California has been specially favored by Nature, with her equable climate and almost perpetual spring, permitting the rapid growth of cereals; with a fertile and adaptable soil, and with crops that can be gathered at leisure under a sky unclouded in the season of harvest. Moreover, through the aid of labor-saving appliances the expenses of farming have been reduced by at least one half. With the use of steam machinery the cost of plowing need not

here exceed fifty cents an acre, and seeding and harrowing are often conducted simultaneously, In the Golden State it is estimated that one hundred and thirty acres can be cultivated with the labor of a single man, while in England the average is one to every fifteen acres. Yet, with the prices recently prevailing, wheat farming is no longer a profitable industry, unless conducted on such a scale as requires a large outlay of capital, much of the land that was formerly planted for wheat being now used for other purposes.

A feature in California agriculture is the size of her farms as compared with other sections of the coast and of the Union, averaging more than four hundred acres, and with a yield of six hundred to seven hundred dollars a year for each of the laborers employed, against three hundred dollars for the United States. Some of the ranches are, as I have said, among the largest in the world, one on the western bank of the Sacramento River having, in 1880, more than fifty thousand acres under cultivation in grain, from which eight hundred thousand dollars was obtained as the proceeds of the crop, the cost of plowing, sowing, reaping, and forwarding to market probably not exceeding fifty cents per bushel.

Notwithstanding the larger profits derived from horticultural and other industries, grain will always be a leading staple among California products. Except for local requirements there is no trustworthy market for any of our cereals, except wheat, whose dryness and glutinous qualities give to it special value as an article of export. From a few thousand bushels in 1850, the wheat crop increased to six million in 1860 and to sixteen million in 1870, to twenty-nine million in 1880; and in 1889, with one or two exceptions the best of our harvest years, to about forty-five million bushels gathered from three million two hundred and fifty thousand acres, and realizing at tide water thirty-five million dollars. From one hundred thousand tons in 1861, our exports of wheat and flour expressed as wheat increased in 1881 to nearly one million tons, valued at thirty-one million dollars, but of decreasing with some fluctuations to six hundred and seventy-five thousand tons, worth twenty millions, for the cereal year ending June 30, 1889. Of late much difficulty has occurred in moving the crops, a large proportion of which remained on the farms or by the side of railroad tracks awaiting transportation, and often suffering injury from the rains. Add to this the excessive rates of freight and labor, the latter difficult

to obtain in the harvest season even at two dollars a day, and it is no wonder that, with wheat selling at one dollar and twenty-five cents a cental, our smaller farmers find it almost impossible to compete with such grain-growing countries as Russia and Hindostan, where wages are but a fraction of those here prevailing.

In our dry California climate barley thrives better than wheat, and in early days was largely cultivated as food for horses and mules, of which thousands were required for hauling goods over the mountain roads to the mines. For 1890 the crop was estimated at sixteen million bushels, and in occasional years has exceeded twenty million bushels, most of it going into home consumption, though with moderate shipments to Eastern breweries. In comparison with other cereals, the production of maize, oats, and rye is inconsiderable, that of the first seldom exceeding five million, and of the two latter perhaps one million five hundred thousand bushels.

In 1849 potatoes sold at one dollar a pound; in 1890 at about seventy-five cents per hundred pounds. So large was the crop of the latter year that in some localities it almost repaid the first cost of the land. As a rule, however, beans are considered more profitable, netting on an average at least sixty dollars an acre, and with certain and quick return. Of the fifty thousand pounds harvested in 1890, thirty-five thousand were raised in Ventura County, mainly of the Lima variety. Winter vegetables are also cultivated for the Eastern markets, shipments for 1891 exceeding three hundred carloads. Of hay the crop often reaches two million tons, chiefly of lucern or alfalfa, which, with the aid of labor-saving machinery, can now in places be grown, cut, cured, and stacked at an expense of one dollar a ton. A feature in recent years has been the increase in our crop of sugar beets, with an annual consumption of ten thousand to fifteen thousand tons by the three beet sugar mills now in operation, of which one is the largest in the United States.

But it is to our resources as a fruit-growing region that attention is now most widely directed, for as the age of gold gave way to the age of grain, so is the latter giving place to an era when the yield of orchard and vineyard will rank foremost among our products. Here can be raised, with few exceptions, all the fruits that thrive in subtropical and temperate climes, as the orange, lime, and lemon, the fig and date, the apple, quince, and pear, the

peach and nectarine, the plum and cherry, with berries and currants of many descriptions, and grapes of almost every known variety. Among our advantages is the warm, rainless summer, causing the trees to come earlier into bearing and to bear more abundant crops than in the fruit regions of the Eastern States, while permitting the best and least expensive methods of drying and curing. On the other hand, we have the disadvantages of excessive freights, three hundred dollars per carload being demanded in 1891 for transportation to the Atlantic coast, or at the rate of about thirty dollars a ton, while the average net returns were less than forty dollars a ton. Complaint was also made of delay in transit, rendering unmarketable considerable portions of the shipments, and this after paying to the railroad companies nearly one half of the total value of the consignments.

From less than one thousand tons in 1871, shipments of fresh fruits to Eastern markets increased to about three thousand six hundred tons in 1881, and for 1890 were estimated at thirty-seven thousand five hundred tons. The first consignments of dried fruits were made in 1875, and amounted to two hundred and seventy-five tons; for 1880 there were only some two hundred tons; but in 1890 the shipments had increased to about seventeen thousand tons. Canned fruits were first shipped in 1872, to the extent of less than one hundred tons, increasing to three thousand three hundred and fifty tons in 1880, and to twenty-eight thousand tons in 1887, since which date there has been a further increase. The dried fruits consisted principally of peaches, prunes, apricots, and raisins, and the canned fruits of peaches, apricots, and pears. As to the general condition of the fruit trade in 1890, the operations of the California Fruit Union will serve as an indication, handling as it did nearly two thirds of our shipments of green deciduous fruits. By this association were shipped eastward, between May and November of that year, thirteen hundred and seventy carloads, mainly to Chicago, but also to points extending as far north as St. Paul and as far south as New Orleans. Its total sales exceeded one million five hundred thousand dollars, with expenses, including freight, commissions, and storage, of seven hundred and eighty thousand dollars, and net returns of seven hundred and twenty thousand dollars. One advantage of their system is its dispatch; a carload arriving overnight is sold at auction before noon on the following day, and a few hours later a check is mailed for the proceeds.

In 1890 the total area of the California vineyards was esti-

mated at two hundred thousand acres, the crop of wine-grapes for that year being the largest as yet recorded. Through lack of experience and of other than local markets, the production of wine has been subject to many disadvantages, and not until recently has it begun to be profitable. It is only within the last decade that the choicer varieties of grapes have been used for wine-making, largely superseding the so-called mission grapes, such as were raised by the padres in the days of Junipero Serra, producing only a coarse and flavorless beverage. But since the organization of the State Board of Viticulture, established in 1880 with a view to foster this industry, a better condition of affairs has prevailed. For 1890 the vintage was estimated at sixteen million gallons, at about which point it had remained for several years. Of late, however, the Eastern and foreign demand have almost kept pace with the supply. From less than three million gallons in 1882, exports increased to eleven million five hundred thousand gallons in 1890, and to this must be added at least five million gallons for the consumption of the Pacific coast. Our wines are gradually finding favor in Eastern markets, and in California are almost superseding imported descriptions.

From ten boxes of raisins, shipped to New York in 1874 by way of experiment, our exports increased to two million boxes in 1890, Fresno County taking the lead as a raisin district, with a total product for that year of nearly one million boxes. From California is now supplied about one half the total consumption of the United States, and at prices little below those of the Malaga product This result is somewhat remarkable, in view of the difference in rates of labor between the two countries, amounting to at least seventy per cent in favor of the Spanish viticulturist; moreover, the duty on imported raisins is offset by a freight charge of nearly two cents a pound from San Francisco to New York against less than half a cent from Spanish ports. But such disadvantages have been more than counterbalanced by our superior process of curing and packing—a process which the Spaniard has yet to learn.

A partial failure of the orange crops of Florida and Louisiana caused the season of 1890–'91 to be one of the most profitable ever known in the citrus region of California, three thousand carloads being shipped to Eastern markets at fairly remunerative prices. Olives thrive well in the southern portion of the State, with a yield of more than one hundred pounds to a tree of seven years' growth. The fig comes into bearing in its third or fourth

year; the peach is a favorite, on account of its abundant fruitage and suitability for shipment, whether fresh or dried or canned; and the Bartlett pear, with its delicate flavor and aroma, ranks among our choicest fruits, often commanding, in Eastern States, a higher price than their own orchard products.

With markets for our fruit extending throughout the East, where the climate in most sections forbids the production of subtropical varieties, the future of our fruit-raising industries is assured almost beyond a peradventure. It may, indeed, be predicted that at no very distant date California is destined to become the orchard of the United States. To bring about such a result there is needed a closer attention to methods of cultivation, a more careful system of irrigation, and such cheaper and better facilities for shipment as will result from competition in overland traffic.

Though for orchards planted in the southern portion of the State, and especially in the citrus belt, irrigation is almost a necessity, it is seldom used in central and northern California except for vegetables and the smaller fruits, while of our grain fields not ten per cent receive artificial watering. In 1889 there were three million three hundred thousand acres under irrigation, and to this area has since been added about five hundred thousand acres. On irrigated tracts it is estimated that returns have been increased by more than fivefold of their former production, and in the counties where irrigation has been most largely developed the result has been to increase even in greater ratio their population and aggregate wealth. Between 1870 and 1890 the population of Los Angeles County increased from fifteen thousand to one hundred thousand, and her taxable wealth from seven million dollars to sixty-seven million dollars; Tulare, from four thousand five hundred to eighty-five thousand, and her assessment roll from three million five hundred thousand dollars to twenty-two million dollars; San Diego, from five thousand to thirty-five thousand, and her property valuation from two million five hundred thousand dollars to twenty-eight million dollars. These, with Fresno and San Bernardino Counties, are the sections containing the most extensive irrigation works.

At the Anaheim colony, for instance, lands originally purchased for two dollars an acre are now rated at from one thousand to two thousand dollars, while other tracts before deemed almost worthless now furnish a comfortable livelihood for a family

Mountain dome in Tuolumne County, California.

on each ten-acre subdivision. Already the occupants of our fruit-growing regions have been multiplied by tens of thousands, and the value of their property by tens of millions; and yet these results may appear insignificant to those who in future years shall avail themselves of the more economic and scientific methods that will follow in the track of experience.

A feature within recent years has been the formation of agricultural and horticultural colonies, provided with irrigation facilities, and to a certain extent co-operative. The success of the Anaheim colony, founded in Los Angeles County on a site laid out and planted under the direction of an experienced viticulturist, encouraged others to follow its example, and led to a subdivision of many of the larger ranches, often with improvements in the shape of irrigating canals, and with incipient orchards and vineyards, in the expectation of building up towns and settlements. To such ventures are due the establishment of thousands of our smaller horticultural homesteads. In Colorado similar experiments have also been attended with success, as in the case of the Greeley and Tennessee colonies, the former containing, only two years after its foundation, several hundred comfortable homes, and with the adjacent lands divided into small agricultural holdings.

The remarks that have been made on the agricultural and horticultural industries of California apply in part to other sections of the coast, and the little that remains to be said on this subject may be condensed into the briefest of phrase.

Apart from California, the only large wheat-growing States are Oregon and Washington, and, though the combined product of the two latter has never been equal to that of the former, it is by no means impossible that either may yet exceed its maximum yield of more than fifty million bushels for the year 1880. At present, however, indications do not point in that direction. For 1892, the Oregon and Washington crop was estimated at twenty-two million, or some three million bushels less than in 1891, against thirty-eight million for California, a gain of about one million bushels over the preceding season. Nor is it probable that the California harvest of 1880 will be surpassed by any section of the Pacific coast for many a year to come. There are but few States in the Union whose wheat crop has amounted to fifty million bushels, and in these such a yield has seldom been duplicated. In Illinois alone has the crop exceeded sixty million bushels, and that also for the year 1880; Kansas, Minnesota, and Indiana

being each credited in 1891 with somewhat over fifty million bushels.

As a fruit-producing region Oregon has in some respects the advantage over California, as in the flavor, substance, and size of its orchard products, and especially of its apples and plums. In southeastern Oregon and Washington are districts suitable for viticulture, and in the former for the fig and apricot. In both these States, with their increasing network of railroads, stock-raising is largely giving place to the production of cereals and fruits.

In Utah we have a remarkable instance of what may be accomplished with the aid of irrigation, and nowhere in this part of the continent has the system of artificial watering been applied with more careful method. Reaching, in 1847, the site of their modern Zion in an almost destitute condition, the Mormons at once undertook the construction of irrigating canals, of which, by 1865, they had completed more than one thousand miles, extending over an area of one hundred and fifty thousand acres. Here the yield of cereals is about the average of the coast, with a crop in choice locations of nearly sixty bushels of wheat or oats to the acre. Such orchard products as apples, peaches, and plums thrive equally well, and for the most part are of excellent quality.

In Colorado are some of the largest irrigation works of the United States, with several hundred reservoirs and several thousand miles of irrigating ditches and canals, supplying in 1890 an area of three million acres. In Wyoming and Idaho a system of artificial watering has also been introduced; but the entire cereal product of the transmontane section of the coast is but a fraction of the yield accredited to the single State of California. Except for Colorado, whose grain and fruit crops were valued, as early as 1883, at more than ten million dollars, this region is still largely dependent on the mining and stock-raising interests, though with a steady, if slow, development of its agricultural resources.

The mild winters of the Pacific slope, and especially of the portion west of the Sierra Nevada, is very favorable to the stock-raising interest, and nowhere do domestic animals thrive better and increase more rapidly than in the sheltered valleys of California. In proportion to population, the quantity of live-stock is unusually large, with an average of nearly twice the number of kine and five or six times the number of sheep *per capita* as compared with the whole United States. Of the two million cattle and the ten million sheep contained on this coast in 1880, about one half

were credited to California; but with the steady encroachment of farmers and fruit-growers on the area available for pasturage this ratio has been greatly reduced. Nevertheless, she contains to-day some of the largest stock farms in the world, a single individual, who in 1850 landed in San Francisco with less than ten dollars in his pocket, owning in 1888 one hundred thousand cattle and eighty thousand sheep, distributed over an area almost equal to that of Rhode Island, and with sales of products amounting to one million five hundred thousand dollars a year. Other States have also their so-called cattle kings, and especially Oregon, Nevada, Colorado, Idaho, and Wyoming, where hundreds of men, starting with no other capital than their own intelligence, industry, and enterprise, have accumulated princely fortunes.

Not the least noticeable feature in the industrial annals of the coast is the progress of its manufactures, though limited, of course, to those sections where agriculture has attracted population and furnished supplies of raw material. Already has been fulfilled in California the prediction of political economists, that the manufacturing interests of the State would exceed both mining and agricultural in aggregate wealth; and yet, in this direction, the Golden State is merely on the threshold of her career. From twenty-three million five hundred thousand dollars in 1860, her manufactured products had increased to more than one hundred and forty million dollars in 1891, distributed among seven thousand establishments, giving employment to fifty thousand operatives, and with an invested capital of at least seventy-five million dollars. These figures, although estimated, may be accepted as approximately true. For 1870 California manufactures were estimated at sixty-six million dollars, and for 1880 at one hundred and sixteen million dollars, at which latter date there were nearly six thousand establishments, with a capital of sixty-one million dollars, employing forty-four thousand hands, and from seventy-three million dollars of material producing one hundred and sixteen million dollars of fabrics. With her magnificent harbor, her railroad system, and her facilities for securing labor and material in sufficient quantity and at reasonable rates, it is but natural that San Francisco should be the manufacturing center of the coast, producing at least three fourths of its entire output, and with an endless variety of products. Here are foundries and machine shops, wire, steel, copper, lead, and other metal works, woolen mills, clothing, and other factories, tanneries, saddleries, and boot

and shoe factories; breweries and distilleries; flour mills and sugar mills; salmon-canning, fruit-canning, and meat-packing establishments, with others too numerous here to be mentioned.

With abundant supplies of raw material, there are nevertheless many serious drawbacks to the manufacturing industries of the Pacific coast. Among them are the sparseness of its population, and the difficulty in securing a foothold in other than local markets; the superior attractions of mining, farming, and horticulture; high rates of taxation; high prices of fuel and water; and, above all, the want of cheap and trustworthy labor, due to the independent spirit and condition of our operatives. As a rule, it must be admitted that this has been the least profitable of all our branches of enterprise, yielding but a meager return on the capital invested. Thus it is that we send to the Eastern States a large proportion of the raw material which, under more favorable conditions, could here be made up into fabrics; that we ship, for instance, to Boston, more than three fourths of our wool clip, to be washed and scoured, made into blankets or clothing, and perhaps returned to us in the shape of fabrics, with all the added charges of freight, commission, and manufacture. In time, however, these defects will be remedied into a cheaper and more plentiful supply of labor and capital, into railroad competition reducing the cost of transport, and with the growing demand developed by a steady increase of population.

In proportion to their population there are several cities which will compare not unfavorably with San Francisco as manufacturing centers, and especially is this true of Portland, whose products increased from two million six hundred thousand dollars in 1880 to about thirty million dollars in 1890. Seattle and Tacoma, both of which were mere villages less than a decade ago, each reported in 1890 an output of twelve million to fourteen million dollars. The manufacturing industries of Colorado represented in 1890 a value of at least fifty million dollars, the foundries, car shops, and factories of Denver alone employing several thousand operatives. Nevertheless, it is improbable that any of these cities will wrest from San Francisco her supremacy as a manufacturing center.

CHAPTER VII.

THE FARMER'S OPPORTUNITIES.

In considering the value of any great land for the uses of civilized man it is of first importance to take into account the character of its soil coating and the relation of that layer of earth material to agriculture. Whatever be the other advantages of a country—however rich its mineral resources, good its climate, and advantageous its situation with reference to the trade of the world—its fitness for the occupation of cultivated people is in the main determined by the harvests which it may yield. Therefore, at the outset of our inquiry into the several great divisions of the earth resources which are provided by North America, we shall note the tillage value of its fields. In order to acquire a clear conception of the problems presented by the soil, it is well to begin the inquiry with some general considerations as to the way in which this coating is formed, how its fertility is maintained, increased, or impaired, and how it stands related to the life which may grow upon it.

The phenomena exhibited by the soil coating of the earth are so familiar that they are often contemptuously overlooked. The mass of decaying mineral and organic matter of which the layer is composed appears to most persons mere dirt. They fail to conceive the marvelous chemical and vital processes which are there in action, or how intimately the work which they do is related to the life of land and sea. It is extremely desirable to have these crude notions cleared away, and to have them replaced with correct ideas which will serve to ennoble our understanding of this, the most marvelous of all the parts of our earth. This end can only be obtained through knowledge. Every person should gain at least a general notion as to the history and function of the soil coating, in order that he may become a guardian of the fields on which the life of his kind intimately depends.

Taking a bit of ordinary soil from the layer in which the plant roots feed, the observer may even with the naked eye, but better with a hand lens, perceive that the mass is made up of

broken bits, generally in the main derived from the rocks, but always more or less mingled with the waste derived from the bodies of plants and animals. A careful experimental study of the soil will show him that the fitness of the material to maintain vegetation is due to this commingling of the *débris* derived from the mineral and the organic kingdoms. A very simple experiment—one which may be noted in almost any country—is exhibited whenever the soil coating has been artificially cut away, leaving bare a portion of the earthy matter below the level to which the plant roots have attained. Although the finely divided rock which composes this earth exactly resembles in its general appearance that which is found in the fertile soil, it is easy to see that it is not fit for the occupation of most plants. Only the lowlier forms manage after a year or two to take root upon it; very often lichens and mosses—forms which have no roots of a distinct character—can maintain themselves on the area. It may require a decade before the superficial layer is sufficiently commingled with organic *débris* to be fit for the occupation of any of the higher forms of vegetation, and centuries may pass before it is converted into a condition of good tillable soil. The fact is, a soil to be fertile requires an intimate mixture of two kinds of decaying materials: that derived from decomposing rocks, and that obtained from the waste of organic life.

The commonest method by which the detritus is formed from bed rocks and introduced into the soil may be observed in any country which is beyond the limits of those northern areas which were occupied by the glacial sheet in the last Ice Epoch and outside of the alluvial plains which border on the larger streams. In these particular fields the soil has been derived from places remote from the position it now occupies, but over most of the earth the mineral matter has come from the bed rocks which immediately underlie the surface. Cutting through this ordinary form of soil coating, and selecting for the exploration a field of virgin forest, we first pass through a layer which may be from a few inches to some feet in depth, and which is altogether composed of decayed vegetable matter. This layer of humus at its base gradually passes into a true soil by becoming more and more intermingled with fine bits of decaying mineral matter. At first the waste of vegetation greatly predominates, but as we descend through this soil the proportion of organic material diminishes, until, at the depth of at most a few feet, we find the subsoil, which is only here and there penetrated by the roots of trees.

Board of Trade Building, Chicago.

This material is generally compact, so hard, indeed, that it has to be excavated with a pick. A little way down in it we begin to find hard bits of rock enveloped by the decayed mineral matter, which often preserves a trace of its bedding planes and joints, so that we see at once that it is the decayed but essentially undisturbed remains of the firmly set earth. Farther down, the size of the undecomposed fragments increases until we attain to the solid foundation of rocky matter.

Although the greater portion of the soil areas of the earth owe their formation, so far as their mineral elements are concerned, to the decay of the rocks which underlie them, and therefore may be called soils immediately derived from the subjacent strata, there are two other important groups in which the rock detritus has a somewhat different origin: these are the alluvial soils which border the rivers and those which rest upon masses of glacially transported detritus. As the alluvial soils are the most common, and on the whole the most important, we shall now consider the conditions of their origin. To trace the history of their formation the observer should take note of what occurs in a district where he may note the movement of the rain water from a district of hills or mountains of sufficient height and steepness to bring about the formation of torrents down the valleys in which these swift streams flow to a region of true rivers and thence to the sea. A little observation will show him how effective is the rain water in breaking up the rocks and forming the soil layer.

Ordinarily, these alluvial plains in which the *débris* worn from the hills by the torrents is for a time lodged are in the flood times of each year overflowed by the turbid waters of the stream and receive some small contribution to their mass from its sediment. In the process of their growth the mineral matter derived from the rocks is thoroughly mingled with vegetable waste, so that throughout the alluvial plain the mass has the general character which, in the case of ordinary soils, characterizes only the upper foot or so of the coating. As long as the detrital matter remains in the alluvial plain the process of decay of the rock material contained in the bowlders, pebbles, and grains of sand goes on rapidly. The waters which percolate through the mass convey a large part of the dissolved matter to the neighboring river, by which it is discharged into the sea. Where the stream flows amid these alluvial plains it is continually swinging slowly to and fro across the valley; here undermining the bank and removing the materials which it has previously deposited, there rebuilding the

terrace where it had previously worn it away. Sometimes, in its wanderings, it forms very devious S-shaped curves, across which from time to time the stream makes short cuts, leaving great portions of its old channel in the form of ox-bow cut-offs or moats.

It needs only a moment's consideration to show us that, owing to the frequent storage of the waste of the rocks in these alluvial plains, it requires on the average a long time for the mineral matter taken from the slopes of the Rocky Mountains or the Appalachians to find its way to the mouth of the rivers into which those fields drain. It is likely that on the average a particle of sand or mud which escapes from the Mississippi into the Gulf of Mexico has been more than five thousand years on the journey from its original site in the bed rock. Owing to the long repose of this mineral matter in the alluvial plain it attains a very extensive decomposition, and being thoroughly intermingled with organic matter it makes a rich and porous soil, into which the roots of plants may readily penetrate to a great depth. In consequence of these conditions the alluvial lands of most countries, in fact those bordering all streams of any size, afford fields of great fertility. They are not all equally rich, for the reason that the character of the mineral matter is determined by the nature of the rocks which are worn in the torrent sections of the stream along the banks of which the deposits lie. Where the valley is altogether occupied by sandstone rocks the mineral matter may be unfit to afford materials for a soil of high grade. Where the deposit is very porous the downward percolating water may pass through it with such ease that the soluble mineral matter may be drained downward to below the level which the roots of ordinary crops can attain. With such slight exceptions, however, the alluvial land of the world affords the richest and the most permanent fields for agriculture.

The indefinite depth of the soil layer and the refreshment of its fertility, which may be secured by allowing the annual flood waters to cover its surface and deposit their contribution of sediments, make them by far the most enduring to tillage. They are, indeed, the only portions of the earth which are not almost necessarily exposed to a rapid depreciation in the harvests they yield, wherever the soil is not continually refreshed by some fertilizing materials artificially brought upon them. The only considerable disadvantage of these alluvial lands arises from floods which may cover their surface during the tillage season. In most regions

where such grounds are extensively used it is necessary to protect them by dikes from these incursions of the stream, but it is desirable to so arrange these barriers that the fertilizing floods may at the proper time have access to the field. When first reduced to cultivation alluvial lands are apt to be productive of malaria, and to be much less wholesome than the higher-lying parts of the country. Experience such as has been gained in Holland indicates, however, that when by engineering work the level of the ground water in the district is maintained at a uniform height during the warm season of the year, this evil, in good part if not altogether disappears, and the soil becomes as well suited to maintain its inhabitants in the state of health as the drier uplands. We may, indeed, regard any land as fortunate which possesses a large area of these river lowlands. Though difficult to bring into the best state for the uses of man, they are, when well ordered, permanently and exceedingly fertile.

The third important group of soils is that which is formed upon the surface which during the last Glacial period was covered by a thick layer of ice which steadily moved over the area of the country. Such a glacial envelope often attained a thickness of thousands of feet, and in its motion over the rocks disrupted even the most firm-set materials, breaking them into fragments varying in size from the finest grains of mud to huge bowlders as large as an ordinary house. This disrupted rock material became mingled with the lower part of the ice and was conveyed toward the front of the glacier, where, by the melting process which arrested the further advance of the ice wall, the *débris* dropped upon the surface of the earth, forming the great walls of detritus known as frontal moraines. When the glacier came to melt away the rocky matter which was inclosed fell upon the earth as the molten water escaped to the streams. This detritus formed a broad sheet of varying thickness, in which the clay, sand, pebbles, and bowlders lie heterogeneously commingled, the whole constituting what is commonly called till or bowlder clay. In the region occupied by the glaciers which covered the northern half of this continent in the last geologic epoch this till covering is the most universal mark of the former presence of the ice. The thickness of the layer where it is present may vary from a few inches to several hundred feet. Its constitution differs according to the nature of the rock whence its components were worn. Sometimes it is merely a sandy clay with rare pebbles and bowlders; again, the large masses of stone are relatively so numerous that the finer

materials can not fill the interspaces between them, and the whole surface seems to be occupied by rudely quarried rocks confusedly heaped together.

Although a bowlder-clay district is commonly much occupied by large fragments of stone which need to be cleared away before the plow can turn a furrow, experience has shown that the soils which are thus laboriously won have certain peculiar excellences. In the first place, in such areas there is no division of a definite kind between superficial soil and subsoil; it is all essentially alike except for the proportion of organic waste which it may contain, and which can be readily increased by deep plowing provided the larger fragments do not make the work impossible. Even when first tilled these soils have usually only a moderate fertility, but they maintain their original productiveness in a very satisfactory manner. The fact is, that the innumerable bits of stone which the mass commonly contains are under the process of tillage continually decaying, and by this decay they contribute fresh and generally valuable mineral matter to the earth. The stirring action of the plow promotes the decomposition of the stone, and thus the pebbles, while in part an obstruction, are really important sources whence the soil may derive refreshment.

It is important for those who have these till soils in their keeping to note the fact that where the earth, as is usually the case, is very pebbly, it is necessary to make the tilth deeper than in ordinary earth, in order to afford the plants a fit share of finely divided mineral matter, which alone can serve their needs. Thus where, as not infrequently occurs, one-half the mass of the soil is made up of bits larger than grains of fine sand, the plowing should be twice as deep as that which would be applied in a fine-grained alluvial or prairie earth. It should also be noted that the waste brought to a surface by glacial action has been exposed during its formation to none of those agencies of decay which so rapidly accomplish the decomposition of river alluvium or of the soil which is formed by the decomposition of the immediately underlying bed rock. While it was conveyed in the ice or subject to the action of the water which melted from it, it was practically unaffected by carbonic acid or the other materials which give such a remarkable solvent power to the soil waters. Moreover, except so far as in the brief time since the close of the Ice period, the roots may have been able to penetrate into the material till deposits lack organic matter. Therefore, those who would secure

profit from such ground should take pains, as far as possible, to deepen the coating in which vegetable mold is present.

It is now a well-ascertained fact that, during the time when the great glacier covered a large part of North America and of Europe, numerous and considerable rivers flowed beneath ice arches at the contact of the glacier with the earth. As the waters of these streams were driven to the ice front under great pressure, they moved with much energy. They bore with them vast amounts of waste, which they discharged at the front of the ice, either on to the bottom of the sea where that front overlapped the margin of the land, or on the surface of the country where the glacial wall lay above the level of the sea. When this *débris* escaped from beneath the ice it was assorted in accordance with the size of the fragments: the pebbles and sand falling near the point of exit of the stream, the clay being carried away to a greater distance. The result is, that beyond the margin of the ice extensive deltalike accumulations of these materials may be found. Where, as in a large part of the shore-land district of Maine, clay was laid down, it affords a stubborn but fertile soil. Where, however, sand was accumulated, as is the case over a large part of the glacial area—as, for instance, in southeastern Massachusetts—the fields are often composed of such purely siliceous materials and are so excessively permeable to water that they will only maintain certain varieties of trees, such as the pines, which are very enduring to drought and are almost valueless for tillage purposes. As the front of the ice gradually retreated across the surface of the country, frequently pausing as it fell back and occasionally readvancing over the ground it had abandoned, these sand plains and clay beds are distributed in a scattered manner over a large part of the northern districts of the continent.

On the southern portion of the ice sheet, particularly in the valley of the upper Missouri and Mississippi Rivers, there are very extensive deposits of a massive nature composed of fine-grained sediments, which were probably deposited in an area of water lying to the south of the great glacier. The peculiarly uniform, compact, and fine-grained character of this material has led geologists to apply to it the name of loess, a word derived from the German language, where it is used to designate like accumulations in the valley of the Rhine and elsewhere. The soil formed upon these loess deposits is of excellent quality, having many of the advantages which pertain to the alluvium of the higher levels along our river banks. Some of the richest soils in

the Northwest are founded upon these materials, and the experience gained in other countries shows that these fields are likely to prove very enduring to tillage.

Although the foregoing divisions of our American soils—we may say, indeed, of the whole world—describe the leading groups of such materials, there are many other less important classes. First among them we may reckon those areas which, though covered with detrital matter composed of commingled mineral and organic waste, are by the conditions of their drainage maintained in a state of such excessive humidity that they are unfit for agricultural use. Nearly all our cultivated plants tolerate only a moderate amount of moisture. Their roots need to find water in the soil; they need, indeed, to be occasionally bathed in the fluid, but they can not perform their functions where their underground parts are continuously submerged. The same limitation applies to all our important forest trees with the exception of the mangrove, the swamp tupulo, and the bald cypress. Few of the arboreal forms in any country can live with their roots below the water level, and these plants manage to tolerate such conditions only because they have certain peculiar structural features which fit them for the singular habit.

In almost all regions which have been thoroughly subjected to the uses of civilization there were originally considerable areas of swamps; thus, up to about the tenth century the island of Great Britain contained vast areas of unimproved morasses, which were so extensive that they served in part as boundaries between the original kingdoms of that country. At the present time scarcely a trace of these inundated lands remains evident to the eye. In our own country, owing to the existence of a frontier region where lands could ever be had for the asking, it has not hitherto been profitable to win these excessively humid areas to agriculture. Only a few hundred square miles of these areas have in a piecemeal and unsystematic way been so brought into tillage. Now that the frontier has disappeared, and our people are being driven to till the lands of a second-rate quality, their attention is being turned to the improvement of these valuable inundated lands.

The total area of the inundated lands of the United States probably exceeds a hundred and fifteen thousand square miles, counting only those flooded areas which are at present unsuited by their excessive humidity for agricultural use, but which may be won to that service by engineering devices such as have been

applied in the regions occupied by the old civilizations. These areas which require drainage may be divided into four classes, the distinction being based on variations in their physical state. First of these come the marine marshes, a belt of lowland along the coast line which is visited by the tides, the surface of which lies between high and low water of these oscillations. The process by which these mud flats are formed is very interesting and easily understood.* Wherever a portion of the shore is sheltered from the ocean waves the winds and tides convey into it a quantity of finely divided *débris*, much of which floats against the coast line and falls as a sediment upon the bottom. As this detritus is of a very fertile nature, it is seized upon by certain varieties of plants, principally grasses, which can withstand the peculiar influence of salt water in a way that is not common to land vegetation. Amid the thickly set stems of these grasses more tidal waste is entangled; the roots and upper parts of the plants are by their growth and decay constantly adding something to these accumulations, and so the shelf rapidly extends from the shore toward the deeper water. The surface of the deposit never rises above the high-tide level, for the reason that the plants in the growing season require the constant visitation of the tide to keep them alive. On the coast of New England the growth of these marine marshes has gone on with such rapidity that in some re-entrants they have formed savannas having an area of several thousand acres.

On the eastern shore, between New York and Portland, the area of these reclaimable marshes amounts to about three hundred and fifty thousand acres. In their present condition these tide-visited fields are of some service to man, as they yield a little hay of inferior quality. South of New York the area of these swamps in proportion to the length of the shore line rapidly increases, but owing to the fact that the rise and fall of the tide is lessened, they can not so easily be won to tillage. A large part of the field, indeed, will demand the use of pumping engines such as are employed in Holland, in order to lower the water level to the plane where the land will become sufficiently dry for plowing. The total area of marine marshes on the Atlantic and Pacific seaboards of the United States, including the shores of the Gulf of Mexico, probably amounts to more than twenty thousand square

* A more detailed description of these marine marshes will be found in the Sixth Annual Report of the United States Geological Survey, pp. 353–398.

miles. Where the rise and fall of the tide exceed on the average five feet, it requires only a system of dikes, with automatic flood gates so arranged as to prevent the ingress of the sea while permitting the outflow of the land water, in order to bring them to a state where they can be made ready for tillage purposes. After the sea is excluded, it is necessary to ditch the land and to break up the dense mat of vegetation formed by the roots of the salt-water grasses. After the land has remained fallow for some years, so that the marine salts which it contains have had a chance to decompose, it will bear abundant crops of grain, hay, or roots, and will maintain itself readily without manuring for an indefinite period. Experience with the salt marshes of Delaware, where considerable areas have been under cultivation, seems to indicate that the fertility of these soils is practically inexhaustible. Reclaimed areas in eastern Massachusetts yield regularly crops of hay greater than can be won in the most favorable seasons from any part of the upland country in the same district.

In southern Florida the marshes of this nature are occupied by a dense growth of mangrove trees, plants which have the curious habit of fixing their roots on the floor of the shallow sea wherever the waves are not so strong as to break up their growth. With this exception the marine marshes, on account of the large amount of salt which they contain, always remain entirely unforested; the plants which occupy their surface never have perennial stems, their roots only surviving through the winter season. South of Chesapeake Bay a relatively large part of these accumulations along the coast, which is formed of the waste brought to the shore by the action of the tide, is but scantily occupied by grasses, and have rather the character of mud flats. Were it not for the fact that the tides have but slight range in height, these deposits, which afford a very fertile soil, could readily be won to tillage.

In the region about the Bay of Fundy, where the tides have a vertical range of from thirty to fifty feet, the currents of the sea next the shore are extremely strong. They sweep about vast quantities of mud. The enterprising folk of this district have followed the plan of diking in the mud flats, so that with the rising tide the floating detritus may enter the basin and be deposited on their bottom. So rapidly is this accumulation formed, that in a few years the level of these impounded areas is lifted to near the plane of high tide; then, by excluding the sea altogether, the surface is quickly made ready for the plow, and it bears abundant

Elevator, Chicago.

harvests. By this process areas which in the aggregate probably exceed fifty thousand acres have been won from the sea. This method of reclamation is probably peculiar to this country; the physical conditions which make it possible rarely exist in any other part of the world.

Owing to their great area and the exceeding fertility of the soils which they afford, the marine marshes of North America and the associated mud flats which may be won to the uses of agriculture constitute one of the most important of our several classes of land reserves. In another century it seems likely that we may gain from these tidal areas lands which from their productiveness will afford a larger food supply than that which is won at the present time from any of our American States. As yet these areas have received but little attention, and their resources, as well as the method of improving them, is unknown to our people. The United States Geological Survey, however, has undertaken a careful study of these and the other areas of inundated land, and the results of this inquiry will in time be fully presented. This systematic study is the more important for the reason that all these redeemable salt-water marshes are near the seashore, and are thus in positions whence their products can be readily transported to market. Moreover, a great portion of their area is near the seaboard cities, where there is always a demand for the products which they may be made to yield.

The next important group of inundated lands consists of areas where the field originally occupied by a lake has by the growth of peaty accumulations been transformed into a swamp. The subject of fresh-water morasses is treated in some detail in the Tenth Annual Report of the United States Geological Survey, pages 255–339. These lacustrine bogs are mainly limited to that portion of the continent which is occupied by the glacial sheet. Owing in part to the irregular manner in which the ice wore away the rocks, and in a yet larger measure to the confused way in which the glacial drift was left upon the surface, this district, at the time of the disappearance of the ice, was the seat of innumerable lakes, the most of which were rather shallow. Winchell says (Final Report, Minnesota Geological Survey, vol. i, p. 130) "the number of lakes in Minnesota is about ten thousand." These are all glacial lakes, and are but the remnants of a still greater number, since transformed to swamps. Although the basins which are still open are to be counted by the tens of thousands, the greater part of them have been modified into bogs,

which, except in the season of inundation, or where they have been converted into reservoirs for the supply of mill-wheels, now appear as broad fields covered with marsh plants or by trees which endure humid conditions.

In southern New England, a region which was early abandoned by the ice in the process of the retreat of the glacier, more than three fourths of these basins have ceased to be permanent lakes. In general we may say that only those water areas of considerable size, where the waves are strong enough to break up the growth of plants which form peat, have entirely escaped this process of filling. Wherever the waves were of trifling size the mosses belonging to the genus *Sphagnum* began to grow along the margin of the water and rapidly extend the mat of vegetation out over its surface. The floating sheet of tangled stems rapidly increased in depth, the more decayed parts fell to the bottom, and so in time, by the upgrowth of the floor and the down-sinking of the floating mass, the area became converted into a continuous bog. When the deposit closed the lake basin the mosses grew upward until the surface became somewhat dry, so that herbaceous plants, or even trees, such as the water maples, could take root upon it.

It is well worth the observer's while to visit some of these lakes where the above-described process of occlusion is as yet incomplete. He will there find that next the shore the peaty deposit extends from the surface downward to the original bottom of the water. Near the margin of the sheet which is toward the open part of the lake he will note the fact that the bog coating is thin, and floats upon the water. By sounding, he will find that the bottom for some distance beyond the floating raft of vegetation is covered with a deep layer of muck formed by the decayed portion of the mosses which have been broken off by the waves. He may here notice a beautiful arrangement by which the frail front of the moss raft is to a great extent protected from the lashing of the water in the time of storms. Numerous species of lilies and of rushes take root upon the bottom, and, lifting their leaves to the surface, make a natural breakwater, which to a great extent destroys the force of the waves.

The total area of these lacustrine swamps within the agricultural district of North America is not yet ascertained, but it probably exceeds forty thousand square miles. A large part of these fields is to a greater or less extent reclaimable. The basins in which they lie are usually somewhat above the general drainage of the country, and the barriers which confine them are often of small

extent, and of easily excavated sand and gravel. In many cases, however, the considerable thickness of the muck deposit and its almost purely vegetable nature makes it necessary to remove the superficial portion of the mass before the area is fit for any ordinary tillage. This excess of peaty matter will, if the region is thoroughly drained, gradually disappear by a process of natural decay, or during dry seasons it may be cleared away by burning in a manner which has been extensively practiced in the reclamation of such lands in northern Europe.

In the eastern part of the United States, and to a certain extent in the region about the western end of the Great Lakes, these fresh-water swamps are now being brought into use for cranberry culture, a peculiar agricultural industry which has developed its methods within the United States. In winning lacustrine bogs to this use the practice is to cut away and remove from the swamp the superficial layer which contains the roots of the living vegetation. The surface of the bared peat is then covered with a coating of sand to the depth of half a foot or so, and in this sand the cranberry vines are planted at intervals of from one to two feet; extending rapidly, they soon cover the surface with a mantle of vegetation. Usually the surface of the bog is provided with ditches to remove the excess of water, and dams with appropriate flood gates are so fitted to the needs that the area may be readily flooded and drained. When properly prepared, the fields which are arranged for this singular culture cost more than those which serve for any other form of cropping. The annual return from the most carefully prepared land may be reckoned at sixty barrels of fruit, worth about five hundred dollars. With a due allowance for the considerable expenses involved in the care of the fields and in the labor of harvesting, the average annual profit from such grounds may be estimated at two hundred dollars—a rate of return which is probably secured only in the best placed market gardens or the richer orange groves of this country. It is interesting to note the fact that this exceedingly high-grade form of tillage is an American invention. Wild cranberries have been gathered in Europe for centuries, but their systematic culture appears to be peculiar to this land.

It seems not improbable that the same method of appropriation which serves to fit bog earths for cranberry culture may serve to prepare the ground for many other market-garden crops where it is desirable in tillage to secure a perfect control of the water supply. The advantage of the coating of sand is found in the

fact that it serves to maintain a firm footing for those who care for the plants, while at the same time the roots may find moisture and nutrition at a little depth beneath the surface. As it is the practice of those who have the care of bogs to put the sand upon the surface when the area is ice-bound, this part of the preparation of the soil can readily be effected. Where these lacustrine bogs are not well placed for drainage they are still in most cases well suited for use as nurseries of timber. The swamp cedar or juniper of the Eastern United States flourishes on the humid earth, growing with exceeding rapidity. As the timber of this tree has a high value even when of small size, it seems likely that its culture may provide a use for many of these swamp areas.

A third group of swamps, one which attains great development in certain parts of the United States, consists of low-lying land the surface of which is elevated to a sufficient height above the general drainage level of the country to permit the rain water to flow away were it not for the dense tangle of vegetation which hinders its movements toward the streams. The great rainfall and humid air in all that part of the Southern lowlands which is within thirty or forty miles of the sea promotes the rapid growth of numerous water-loving plants, which form a very dense tangle on the surface of the ground. The most important of these moisture-loving species is the ordinary reed or cane which abounds in all this Southern country. It is a peculiarity of this species that the stems tend to grow very close together and to attain a great height. In the denser canebrakes there are often from fifty to a hundred stems to the square foot of area, and the slender column may rise to the height of ten feet or more. The vegetation is perennial, and the leaves which fall each season become packed in between the stems of the living and dead plants, forming a mass so dense that the water encounters great friction in making its way toward the drainage channels. Thus the effect of this and other plants is to maintain the land in an excessively watered state throughout the year.

An excellent example of this class of upland swamps is afforded by the great morasses which lie on and about Albemarle and Pamlico Sounds, in North Carolina and Virginia. In this district we have an area of more than four thousand square miles, nearly all of which lies at elevations of from five to twenty-five feet above the plane of the neighboring tidewater. Experience has shown that when the mat of vegetation is cleared away, as may be readily effected by fire in very dry seasons, and the

ground is properly ditched to secure the more rapid discharge of the water, the soil which is thereby won is of great and enduring fertility. The result of the long-continued swamp condition has been to store in the otherwise sandy earth a very large amount of material suited to the needs of all our ordinary crops. So far these upland morasses of the South have been mainly valued for the timber which they contain; they are naturally well adapted to the growth of two species which afford valuable wood, the juniper and the bald cypress; yet around the margins of these swamps a fringe of their lands has been won to tillage. The proper improvement of the areas demands that the drainage works be prosecuted on a large scale and under skillful management. With such a system of engineering work there will be no difficulty in winning all the areas of this class of inundated lands to the uses of agriculture; and the fields so gained will be far more fruitful than any equal areas situated in the States in which they lie. It is indeed doubtful whether any land in the United States, except some portions of the Mississippi alluvial fields, are as valuable for the uses of the farmer. For market-garden purposes they appear to be unsurpassed. The total area of the bogs of this nature where the excessive humidity of the land is due mainly if not altogether to the natural vegetation, is not yet ascertained, but it amounts to many thousand square miles.

The last important group of American swamps which we shall have to consider is that which is formed in the alluvial districts of the greater rivers. It is a common feature of these detrital plains or benches—a feature which becomes more characteristic of them as they approach the sea—that the land is highest next the channel of the stream, and gradually declines from its margin toward the base of the upland which borders the valley on either side. The result is, that along the banks of the Mississippi River and some of our other greater streams only narrow strips of the alluvial plain are tillable even when protected by dikes. Passing from the margin of the river we often find that at a distance of a mile from its border the ground has declined so much in height that it is in the condition of permanent marsh. The reason for this curious slope of the alluvial plain away from the waters of the stream to which it owes its construction is as follows: When the river overflows its banks and the flood-water enters the tangle of the forest on either side, the motion is arrested, and the sediment which was held up in the water by the stirring to which it was exposed in the current quickly settles to the bottom.

By far the larger part of this suspended matter is deposited near the margin of the open current. The result is, that the part of the alluvial plain next the stream is built up with considerable rapidity, while that of the back swamps rises very slowly.

The total area of these fluviatile marshes in the United States is considerably less than that of any of the other groups before mentioned. The greater part of the area is contained within the Mississippi delta, or the section of its alluvial land between the Gulf of Mexico and the point where it receives its principal confluent, the Ohio River. Some areas of a similar nature exist along the banks of the Missouri, the upper Mississippi, and the Ohio, as well as in the plains of the other streams which flow into the Atlantic and the Gulf of Mexico. In general these back swamps are unfavorably placed for reclamation. The height of their floors is usually only a little above the plain of the river even in the dry season of the year, and, as they commonly receive a good deal of drainage water from the neighboring country, it is in most cases very difficult to protect them by diking. Their improvement will have to await the time when the demand for land in this country is sufficiently great to make it worth while to drain them in the manner practiced under similar conditions in Holland by means of pumps operated by windmills or by steam power. The more elevated portions of the alluvial plains are not properly to be ranked as swamps, though they may fall in the class of inundated lands. Along the banks of all our larger rivers the alluvial plains which lie below the level of the greater floods are subject to inundation, which occasionally damage or destroy the crops. From Cairo southward to the Gulf nearly the whole of these fluviatile areas are exposed to such frequent incursions of the flood waters that the land is unserviceable except where it has been protected from overflow by a system of dikes —levees as they are called in that part of the country. Even with these protections the agriculturist is continually in peril, for the endless lateral swingings of the stream are ever likely to undermine the defenses which protect him from the incursions of the mighty river.

In the extreme southern part of Florida we find in the district of the Everglades a single field representing a type of swamp which, though unique within the limits of the United States, is not uncommon along the tropical shores of this and other continents. The Everglades lie upon a foundation of marine deposits such as are formed in and about coral reefs. The deposit was

laid down upon the floor of a shallow sea, and has recently been uplifted so that its surface is a little above tide level. Around the seaboard of this field there is a prevailing dense tangle of vegetation mainly composed of the mangrove tree, which, as before remarked, flourishes exceedingly when its roots obtain access to salt water. The effect of this peculiar matlike jungle is to restrain the outflow of the water from the Everglade district. This action, though done on the main to the mangrove, is combined with that of many other water-loving plants, with the result that during the season of heavy rains nearly the whole of the area is covered with water. In the time of scanty rain of the winter and early spring this water drains away, so that more than two thirds of the area is moderately dry. In its general character and the conditions of its formation the Everglade swamp somewhat resembles the elevated bogs which have just been described, and of which the Dismal Swamp of Virginia may be taken as a type; but this inundated district of Florida is distinguished by the fact that the water is to a great extent retained by the rim of vegetation of a very dense character which surrounds its margin.

The exceeding richness of the soils which are formed beneath the swamps of this and other countries appears to be in the main due to the fact that the deposits there formed contain a singularly large amount of limy matter, partly in the state of lime phosphate, a substance which is most essential to the development of nearly all our important crops. This phosphatic deposit appears to be accumulated through the actions brought about by the growth and death of the various species of small crustaceans which inhabit the waters of the bog. The hard shells of these little creatures, like those of the kindred crabs and lobsters, are to a great extent composed of lime phosphate, which they obtain from the swamp vegetation, the plants securing the store from the water of the swamp. When these crustaceans die, their shells are built into the strata which accumulate on the floor of the area and serve to enrich the soil. Various other substances useful to our crops are gathered from the water by the plants and similarly contributed to the peaty matter. The result is that in all our swamps we find a concentration of the mineral materials which have drained into the basin from the higher-lying land about it. Every bog is a garner where is stored away materials which, but for the presence of the basin, would through the rivers have passed directly to the sea.

By way of contrast with the group of soils which are rendered

useless to man through their excessive humidity, we may next consider the yet wider fields of this country which are to a greater or less extent sterilized through their lack of sufficient rainfall or the failure of that precipitation to occur in the season when crops require the moisture. The greater portion of this insufficiently watered field lies to the west of the one hundredth meridian, extending from near that line to the belt of country which lies within about two hundred miles or less of the Pacific coast. On the south it extends to the shore of that ocean. It includes a large part of northern Mexico, the whole of Lower California, and nearly the whole of the Cordilleran region within the limits of the United States. Throughout this vast area the rainfall is either insufficient, or so variable as to make ordinary tillage impossible.

Although this region has commonly been regarded as a desert, there are only a few portions of its area—lying mainly in Nevada, Utah, Arizona, New Mexico, and the northern parts of Old Mexico—where the conditions render widespread areas unfit for any form of tillage. The greater portion of the district contains fields of considerable extent which may be watered by irrigation ditches and canals, and when so provided with moisture the soil is of exceeding fertility. Over a large part of the area the natural pasturage has a certain value for cattle and sheep, and its forage resources can doubtless be considerably increased by the introduction of foreign species of plants which afford nutritious food for cattle and which will endure a dry climate. The total area of these lands which may be won to tillage by irrigation methods probably exceeds fifty thousand square miles, and the food-producing capacity of the soil will, on account of the large returns which it affords, probably be at least as great as is at present obtained from the States of Indiana, Illinois, and Wisconsin.

In order to win any large share of these irrigable lands to a profitable state it will be necessary for the water system of each river basin to be managed in such a fashion that the annual flow shall be properly distributed with reference to the areas of ground which lie in a suitable position for watering. In the present condition of our land laws the process of improvement is sure to be interfered with by the conflict between the different landowners. It is difficult to see how, under our system of government and with our peculiar method of land tenure, this control can well be accomplished. Our laws of proprietorship have unfortunately been derived from a country where the ownership of water, except for mill purposes or for fishing, was a matter of no

importance. Never before having dwelt in an arid climate, our people are without customs or traditions which control the management of streams when they are used for irrigation. The only practicable method of attaining the end which it is necessary to win, if this arid country is to come by its possibilities, is to put the control of the stream, in all matters which pertain to the use of its waters on the land, in the hands of some authorities who represent the people in the particular valley. Proper legislation looking to this or some other equally effective end is imperatively and immediately necessary, for the reason that individuals and private corporations are now acquiring water rights which may debar existing and future settlers from a reasonable chance of using the needed scanty water supply which the country affords.

Much improvement has been made of late years in the introduction of artesian water for irrigation purposes, and this method promises to be of great value in the future development of the arid region. In 1890, according to the census bulletin, there were 8,097 artesian wells in the western half of the United States. Of these, 3,930 were used for irrigating, and were made to water 51,896 acres of land, or 13.21 acres per well. One half of these wells were in California, where fruit-raising makes it possible to use so expensive a method.

On a large part of the lands which lie within the arid district of North America the soil is of a great depth, and is richly stored with the mineral matters which are necessary to vegetation, particularly the materials which are required by our grain crops. It seems clear that in very recent times,* probably during the Glacial period, this area was the seat of abundant rainfall, when all the country was well watered, and when the interior lakes which now remain as shrunken salt seas freely discharged over the neighboring "divides" into the channels of the greater rivers. Since the desiccation of this country began and the vegetation to a great extent died away, the scanty precipitation has favored the decomposition of the rocky matter, until the soil, which has been very little leached by the passage of the water through it, has become excessively charged with dissolved mineral matter. The result is, that these lands are often covered, in the dry season at least, with a coating of what is commonly

* For very interesting descriptions of these changes in climatic conditions, reference may be made to Gilbert's Lake Bonneville, Monograph I, U. S. Geological Survey, and to Russel's Lake Lahontan, Monograph XI, U. S. Geological Survey, or to abstracts of these in the Second and Third Annual Reports of the U. S. Geological Survey.

termed alkali, but which consists of varied mineral substances, in their character differing in separate fields, which have been left upon the ground as the water of the soil was evaporated. It is often assumed that this coating invariably indicates an ineradicable evil in the earth, and that the ground so covered is unsuited to tillage. That this is not always the case is fully proved by the fact that when our tidal marshes are first brought into use a similar crust of mineral matters whitens the surface in times of drought, and for a few years may reappear in such quantities as to be hurtful to young plants. Also, in one of the most fertile districts in the delta region of the Nile it has been found that, when the farmers did not use a sufficient amount of irrigation water, a crust of the same nature appeared on the surface of the ground and was likewise injurious to the crops.

So far from the alkaline coating indicating a necessarily infertile soil, it is rather to be taken as a proof that the detrital matter contains an excess of such soluble materials as may with the proper water supply serve the needs of plants. The fact is that any soil which is deep and thoroughly charged with dissolvable mineral matter will, if subjected to a rainfall so slight in quantity that the material is not taken away by the springs as rapidly as it is formed, become covered with such an incrustation. When the dry air evaporates the water on the surface, it necessarily leaves behind it all the mineral matter which it contained, while at the same time more water is drawn up through the crevices of the surface in the manner in which oil is brought up to the flame of a lamp-wick. In fact, the crust of the wick and that of the soil owe their origin to essentially similar actions. In general, when fields are covered with this alkali crust it requires only plowing and abundant irrigation quickly to bring the earth into a state where the crust-forming material no longer exists in such quantities as to reproduce the coating. Even where irrigation can not be used, but where the rainfall is sufficient for certain crops, deep plowing will to a certain extent effect the same result. If the coating contains a considerable amount of magnesia, as is not infrequently the case, it is usually necessary to apply a coating of ordinary lime, which by a simple chemical reaction remedies the evil.

A number of circumstances have combined to direct the attention of our people to the improvement of our arid land. The interest in such betterment is greater than in the case of the inundated districts, for the reason that the Cordilleran district is

the seat already of very extensive mining enterprises, and this industry is advancing with exceeding rapidity; the only hindrance to its growth being found in the arid character of the country, which makes it necessary to import food from very distant fields—a tax which greatly increases the cost of the labor which is used in the mines. The first irrigation works of this field of the Cordilleras appears to have been constructed by the Spaniards and the Indians. The latter practiced the art long before they were subjected to the influence of Europeans. When the Mormons were driven from Nauvoo they took refuge in the Salt Lake Valley, where agriculture was only possible by means of irrigation. Through them the art was introduced to our frontiersmen, and, with the readiness which characterizes those people, they have already undertaken constructions which are only surpassed by the similar imperial works of British India. So rapid is the progress of these hydraulic systems in our arid districts, that before the middle of the next century they seem likely in their importance far to exceed those of any other country.

According to the returns of the census for 1890, there were in the Territories so far reported upon 1,669,448 acres of land in the arid regions upon which crops were raised during the year 1890. Since the reports upon several of the important districts are not yet published, these statistics are only partially complete. It is probable that the number of acres will be increased to not far from two million five hundred thousand. These statistics are simply for the acreage actually furnishing crops during that year, and hence fall far short of the total area capable of irrigation under the present system. From three to five tenths of one per cent of the total area of the regions are cultivated. Of the remainder a very large percentage can never be reclaimed. The statistics in detail are as follows:

Arizona	65,821	acres.
New Mexico	91,745	"
Utah	263,473	"
Wyoming	229,676	"
Montana	350,582	"
Idaho	217,005	"
Nevada	224,403	"
Oregon	177,944	"
Washington	48,799	"

Besides the arid lands, properly so called, of this country, a large part of the area of the Mississippi Valley and a portion of

the eastern slope of the continent, though receiving a large annual rainfall, are more or less subject to summer droughts. There are indeed few fields in this country which are adequately and uniformly watered. As the advantages of irrigation are the better understood, there is no doubt that the area which will be subjected to such a treatment in the region east of the one hundredth meridian will be far greater than that which can be thus won to culture in the Cordilleran district. Many areas which now bear crops which the farmer deemed thoroughly satisfactory can readily be made to yield a double harvest by leading in the waters of the neighboring streams. Although irrigation is applicable to much of this country which is now pretty well watered, the results won by the method in the arid districts will doubtless always be more satisfactory than elsewhere. The reasons for this are twofold. In the first place, the soils of that region are, as before noted, exceedingly rich in mineral materials which have been rendered soluble during centuries of exposure through which vegetation has made no attack on the resources, and they have not been leached away by heavy rains; in the second place, the clear skies of this part of the world appear greatly to promote the growth of plants and the perfect development of their seeds and fruit. It seems likely that the continuity of the sunlight in part accounts for the remarkable growth of crops on these artificially watered soils.

There is another group of soils—that of the prairies—which is in its nature somewhat distinguished from the classes which we have already considered. Although treeless plains exist in regions which are well watered on several other continents, the largest fields of this description and those with the most fertile soil belong to North America. In general, wherever a region is thickly soil-clad and in receipt of a considerable rainfall, the surface is occupied by dense forests. In the region of the upper Mississippi, however, and in the valleys of all the great confluents of that river there are vast timberless areas, more or less fretted by belts of forest which have developed along the streams. As regards the character of soil and form of surface, the prairie districts exhibit much variety in their condition. In general, the state of the immediate under earth is that which is given by the long-continued growth of a dense vegetation where the tops of the plants die down each year while the roots are perennial. Before the first plowing this dense mat of underground stems forms a coating which is often about a foot in thickness. The subsoil is com-

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pact and commonly rather destitute of vegetable matter, characteristics which are due to the absence of strong roots such as the forest trees afford, and which in wooded districts act as plows to stir the lower-lying earth for the depth of some feet below the surface, and by their decay to introduce into it a certain amount of vegetable matter. In the section of the prairie country near the southern shores of the Great Lakes there is a more or less considerable amount of fine detritus just below the soil which has accumulated in the area when those great water basins were at a higher level than at present. In the region about the upper Mississippi and Missouri Rivers the soil often lies on deposits of loess, a fine-grained sediment which appears in part at least to have been laid down on the area when the front of the ice sheet was near by. In yet other portions of the open country the soil rests upon ordinary glacial drift; here and there it lies upon the bed rocks, and clearly has derived its mineral matter from these subjacent strata.

Certain portions of the prairies deserve the name of plains, for the surface has a gently rolling aspect and appears to the eye almost perfectly level. In other parts of the district the surface is cast into a more irregular form, which received the name of rolling prairies. A careful inspection will convince the observer that the essential peculiarity of this part of the continent is due to the absence of timber where, so far as the moisture and other features of the climate are concerned, forests might well have grown. Various suggestions have been made to explain the lack of forest trees in this fertile and well-watered country. The most likely supposition seems to be that the woods which in the time just after the Glacial period were doubtless abundantly developed over most if not the whole of this surface up to and within the Rocky Mountains, were in the drier conditions which have recently come upon the country destroyed by the action of fire. It is a well-known fact that the aborigines of this country were in the habit of burning over the surface of the plains in order to promote the growth of the grasses which gave pasturage to the buffalo and the other wild animals which abound in this part of the world. These fires in the dry season extended into the regions of woodland, and destroyed the young growth in such fashion that the western border of the Appalachian woodlands was driven further to the east than it belonged, so far as its distribution was determined by the climatal conditions of the country.

The effect of these prairies upon the agriculture of the Mis-

sissippi Valley has been very great, and has been mainly due to the exceeding fertility of the soil which they possess and to the unwooded character of their surface. Among the many difficulties encountered in the subjugation of the eastern part of North America to the uses of agriculture, the greatest has arisen from the universal presence of dense forests in that part of the continent. The pioneer has been compelled to remove the woods and eradicate the stumps of the trees before he could obtain any real command of the soil resources. Beginning in his youth the laborer was fortunate if with strong arms he could during a lifetime of toil reduce a hundred acres to a good state for the plow. It was a century and a half before the westward-setting tide of our population slowly cut its way through the great Appalachian forest and entered upon the fertile, unwooded district of the prairies, where the land demanded only breaking to be brought into use. The result of this great opportunity afforded by the timberless lands of the West has been to give a very swift increase to the yield of the soil of North America in the sixty or seventy years which have elapsed since our people entered on the possession of the prairie land.

Owing to the absence of primeval forests in the prairie district and to the abundant growth of grasses in that field—a condition which has prevailed for many centuries—the soil has become richly stored with soluble mineral matter. Where a country is enveloped with a dense forest, the mass of decayed vegetation accumulated upon it retains the greater part of the water as in a sponge, and gradually yields it to the true soil. Passing through this soil the ground water takes up the soluble mineral matter and discharges it through the rivers to the sea. The result is that in these conditions the mineral material which is in the state to serve the need of plants is not accumulated, but is steadfastly removed about as fast as it is formed. On the other hand, where as in the case of the prairies, the surface is covered by a densely compacted mass of fine grass roots and has only a very thin layer of decayed vegetation, the rain enters the soil with difficulty, and a far greater amount of the precipitation is discharged over the surface, and thus obtains possession of little of the soluble material of the under earth. In a word, the leaching process is very perfectly carried on beneath the primeval wood, but is imperfectly performed under a prairie soil. The grasses of the prairie district, belonging in the same group of plants as our ordinary small grains, appropriate mineral matter of essentially the same description as

is required for our most important field crops. As their products are not taken away, but are annually restored to the soil, they aided in preparing the ground for the service of man. The result of these conditions has been found in the extreme fertility which the prairies exhibit when the soil is first tilled, and when the crops avail themselves of the plant-food which has been long accumulating in the earth.

It is characteristic of the prairie soils that, while they yield surprisingly abundant crops of grain for some years after they are first brought into cultivation, the returns from the fields, unless they be artificially fertilized, are, after a few decades, subject to a rapid depreciation. In place of the thirty or forty bushels of wheat which they may at first afford, the yield generally falls away to an average of not more than fifteen or twenty bushels. Thus their fertility, as far as the natural resources are concerned, is of a temporary nature, and can, as elsewhere, only be maintained by modes of tillage in which the refreshment of the soil is properly cared for. Notwithstanding this tendency to depreciation, the prairie district is to be reckoned as the largest field of high-grade soils which is in the possession of our race. With due care the resources which it affords may remain in unimpaired possession of the people.

Whatever may be the diversity in the conditions which leads to the formation of a soil, the fertility of the deposit in the main depends upon the character of the rocks whence its mineral elements have been derived. It is on the chemical nature of the mineral foundations of a country that the value of its detrital covering to man inevitably rests. Where the rocks which afford the detritus abound in lime, potash, soda, and phosphoric acid, the soil is sure to be of a fertile nature; where, on the other hand, the rocks of the region are composed of very silicious sandstones, as is the case in many parts of the world, or even where the underlying deposits are of an extremely clayey nature, the resulting soils are apt to be infertile. In general we may say that the fertility of the earth mainly depends upon the amount of organic matter which was laid down in the strata at the time when they were formed as muds upon the ancient sea floor; for it is through the action of organic bodies that the chemical elements which are necessary to vegetation were separated from the sea water and stored in the strata. Fortunately, the geological history of North America has provided the greater portion of its area with deposits which yield detritus well suited to the formation of

fertile soil. A very large part of its surface, perhaps more than half the total area, is underlaid by rock, which yields a considerable portion of the required elements in the process of their decay. Some portions of the territory—perhaps in the aggregate as much as one tenth of its area—is underlaid by limestones, which are crowded with fossil organic remains belonging to species which had the habit of storing lime phosphate in their bodies. The soils which have been formed on these rocks are invariably fertile, and depreciate but slowly through the process of cropping. The most characteristic, though not the largest of these limestone areas, where the soil is founded on rocks which yield exceedingly fertile *débris*, lies in the Ohio Valley, between Springfield, Ohio, and the southern portion of Tennessee. In the northern part of this area, as far south as Cincinnati, the fertility-giving influence of the underlying strata is somewhat masked by the coating of glacial drift which is here much intermingled with the waste of other rocks; but in the States of Kentucky and Tennessee this great limestone area has a soil which is entirely made up of the waste from the underlying deposits. An experience of a century's duration has shown that these soils of the blue-grass district withstand the loss of tillage more perfectly than any other in the United States, except it be the rich alluvial lands, or those won from the marine marshes and mud flats of the north Atlantic coast.

In passing in an east or west direction from the limestone district above noted, we enter at once upon the higher-lying rocks which are prevailingly destitute of lime and the other materials the presence of which is due to organic action. The transition in the character indicates the change in the underlying rock in a startlingly distinct manner. Within the distance of a mile we may often pass from fields of exceeding fertility to those of very inferior quality. At many points the transition from the fertility-giving underlying rock of a limy nature to the sandy layers is observable within a distance of a hundred feet. Wherever, in the dislocations of the strata which occur in the Appalachian Mountains, these limestones of Silurian period which underlie the central part of Kentucky are brought to the surface, they make a rich area, such as that of the Powell Valley near Cumberland Gap, where rocks of this age and quality are bordered by sandstone strata of various ages which afford sterile soils. The valley itself is exceedingly fertile, while the hills which wall it in have a thin and sterile soil.

Although the soils of North America are prevailingly in their

nature extremely well adapted to the uses of agriculture, their conditions present certain peculiar features the nature of which should be clearly apprehended by all who are concerned in their care. They should indeed be understood and well considered by every citizen, for each dweller in the land is immediately interested in all which relates to the preservation of its earth resources. Upon those resources his own well-being and that of his posterity absolutely depend. In their occupation of our territory the American people came into possession of a virgin soil, of fields in which the natural processes had for ages been accumulating the stores of nutriment which the crops remove. So far our agriculture has almost altogether rested upon these ancient accumulations of fertility. By a swift and unheeding process of tillage we have been gathering in this harvest and sending the products away to foreign lands. Except in the longer settled parts of the country, little attention has been given to the conservation of the soil. Over great areas the farmers have been in the habit of winning what the earth would afford without any system of manuring, and when the land was thus impoverished they have abandoned the exhausted fields for the farther frontier. In general the plow tillage has been but shallow, so that the deeper resources of the plant-sustaining layer are happily to a great extent unimpaired. Many of these nomadic farmers have abandoned fertile ground which was but six inches below the surface of the field for land which was a thousand miles away in the West. This reckless system of tillage is now rapidly giving way to a more considerate and legitimate agriculture. Not the least of the advantages that will arise from the fact that all the naturally remunerative soils of this country, except some contained in the Indian reservations, has now passed out of the hands of the Government, will be found in the arrest which has at last been brought about to the unprofitable wandering of our farming population. They will soon have to abide on the land from generation to generation, and thereby form a close union with an ancestral earth.

The almost necessary object of the American farmer has been to win as rapidly as possible the largest attainable returns from the soil. Entering upon a new country, he has had to provide himself with the necessities and the conveniences of civilization which in long-tilled lands have been acquired by centuries of labor. To a certain extent he has been justified in pursuing the methods which would best attain this end. By shallow plowing, by the neglect of artificial fertilizing, by rudely tilling a large

area, and thus turning the most accessible wealth of the soil into his garners, he has immediately bettered the conditions of his household. Unfortunately, all systems of labor tend to perpetuate themselves, and in no class is this conservatism more marked than among farmers. The difficulty at present is to change this method of work, which was warranted at the outset of our agriculture, into a system which now fits the conditions of our population. As is indicated by the language of modern agricultural science, the farming methods hitherto pursued in the greater portion of this land have been in their nature extensive, the aim being to till as large an area as possible, and to win from it the greatest immediate returns. We need now to exchange this plan of work for a system of intensive culture, where the object is also to secure the greatest immediate profit, but at the same time to maintain, and if possible to increase, the yield which the fields may afford. In the greater part of Europe the conditions are such as to enforce this latter method in the management of the soil, and in that region the relations of the farming class to the earth are such as to make the use of this system imperative.

The transition from the old extensive to the new intensive methods of tillage will tax the understanding of our farming class in a more serious measure than may at first sight appear to be the case. There are, however, a number of conditions which are now at work, and which bid fair to bring about the change in a tolerably rapid manner. The people of English blood in this country have acquired a great confidence in the results of scientific research, and have thereby escaped in a remarkable way from the thorough domination of tradition which prevails in other lands. The soil-tillers, in particular, have come to look to the literature of their science, particularly to that which contains the results of researches made by our Government bureaus and scientific stations for guidance in their work. A very large part of our population has, as is shown by the vast array of American inventions, an experimental turn of mind. They are, indeed, more possessed with the spirit of inquiry than any other people. The same motive which had led to the almost innumerable inventions which pertain to the agricultural art is sure to favor the improvement in the treatment of the soil. As soon as our farmers come to feel that they and their descendants are likely to abide upon the ground which they now occupy, a state of mind which the occupation of the great West is rapidly engendering, we may expect our tillage methods to rise to the highest plane of the art.

Among the conditions which will serve to insure a development in the immediate future of a high-grade agriculture in this country is the existence within its limits of large deposits of materials from which artificial fertilizers are manufactured. These accumulations are mainly found in the section of the coast belt between the James River and the southern portion of Florida. In this section of the country the deposits of lime phosphate, sufficiently rich to be used in the manufacture of artificial manures, occupy a larger area than in any other known part of the world. As the beds in western Florida containing the materials are near the surface, they can be worked in open pits, and the rock, containing sixty per cent or more of the lime phosphate, can be mined at a cost of about a dollar a ton. The most rapid advance in our tillage methods, and that which promises in the end to bring about the greatest and most far-reaching improvement in the system of farming, has arisen from the use of these artificial manures. Every farmer who employs them on his fields necessarily learns how profitable it is to till a small area in a careful way. In proportion as our agriculture comes to rely on these costly methods of manuring, the motives which lead to the care of the soil and the understanding of its conditions will surely be strengthened.

As yet the search for mineral fertilizers has, within the limits of this country, been but begun. Somewhat unfortunately, the varieties of rocks which are valuable for such purposes do not indicate their utility, at least to the untrained eye, by their outward aspect. They often appear as ordinary limestone, or at times as nodular bits of rock which have no evident value. Owing to their peculiar chemical constitution, which demands a treatment by acid before the phosphoric matter may be easily obtained by plants, the soil immediately overlying these deposits may exhibit no unusual fertility. If this country had been searched for mineral fertilizers as it has been examined for ores of gold and silver, it is likely that we should have access to tenfold the number of localities which are now known to exist within the area of the continent Considering the fact that it is only about forty years since lime phosphate was resorted to in order to prepare an imitation of guano, the extension of use which is made of these geological sources of enriching material has advanced in a very rapid manner. At present the greater part of the cotton crop is aided in its growth by the use of lime phosphate more or less intermingled with other fertilizing materials, and a large por-

tion of our garden produce is likewise fed with the same material. Gradually the use of this artificial aid to the fertility of the soil is being extended to other crops. It is easy to foresee that at the present rate in the increase in the use of the geological manures they will be made to serve in the course of the coming decade in a large part of the agricultural work of this country.

In addition to the sources whence lime or lime phosphate may be obtained, North America contains extensive deposits of marl, which affords mainly the salts of potash and soda, as well as fields which are rich in gypsum. The potash-bearing marls appear to be mainly limited to the newer rocks of Cretaceous and Tertiary age which occur in the coastal belt of the Atlantic and the Gulf of Mexico. The deposits of gypsum occur in the district about the Gulf of St. Lawrence, in the southern Appalachians, and in the Cordilleran fields. Although these marls and gypsums are of local use, they have not sufficient value to make it worth while to use them in a general commercial way. The principal resource of this kind must be found in the deposits of lime phosphate. In the preparation of this material it is the custom of the manufacturers to treat the rock with sulphuric acid and to mingle with the product a considerable amount of the refuse of animal bodies, which serve to yield nitrogen to the soil. Fortunately for the cheap production of the compound, the waters of the Atlantic coast abound in fishes which are captured for making oil, and the waste from the factories, known as fish pumice, is available at a moderate price. The sulphuric acid required for the chemical treatment of lime phosphate is readily to be obtained from the abundant deposits of iron pyrites which exist in many of the districts of crystalline rocks near the eastern shore of North America. Thus, as a whole, this country is very well placed for the production of those artificial fertilizers which not only increase the yield of the soil, but help to induce the more careful treatment of the fields.

So far our considerations have been mainly directed toward the advantages presented by the soils of this continent. It is now necessary to set forth certain evils in their management which are due in part to the physical conditions of the country and in part to the neglect of proper precautions in the tillage methods. Although there are extensive regions of plain-land in this country, a large part of its area is of a hilly nature, the soil lying upon slopes of from five to twenty degrees of inclination. On such declivities the rainfall tends rapidly to wash the soil from its original position into

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the lower part of the valleys and thence to the streams. This evil, though considerable in Europe, is much more serious in this country, for the reason that the American fields are commonly subjected to torrential rainfalls. Even where the annual precipitation is insufficient for the needs of agriculture, it often happens that several inches of rain descends in a single brief shower.

When a torrential rain falls upon the surface of the tilled earth, especially where the soil has recently been released from the frozen state, the effect may be calamitous. A single such shower may remove the loose earth to the depth of half an inch or more from a considerable surface of country, and a score of such accidents can almost destroy the fertility in fields which were originally very productive. In a state of nature the soil is everywhere protected from the injury which the rain may inflict by the coating of vegetation which forms upon its surface wherever the precipitation is considerable and the detritus of sufficient thickness to nurture plants. In densely forested districts the tangle of decayed vegetation generally retains all the water which falls upon the surface, and yields it but slowly to the streams. Even where the area has the character of our prairies and other open plains, the firm mat of roots, a covering which is so deep and fibrous that it is difficult to break it with a plow, acts as a shield to protect the earth from the rude assaults of the surface water. Unfortunately, all tillage demands that this protecting covering be from time to time stripped away. Where the crops are of grass or of small grain these cultivated plants may in a few weeks partly restore the shield of vegetation; but where, as with Indian corn, cotton, and many other crops, the plants are necessarily far apart and the soil is tilled during a period of some months' duration, the earth is unprotected during a great part of the year. Such fields, when the harvest is gathered, are commonly exposed during the following winter to the assault of the rain, and thus waste with exceeding rapidity.

The evils which arise from the action of heavy rains on the plowed ground of this country vary greatly in different portions of the area. They are least in the districts which are underlaid by a sheet of glacial *débris;* that coating is often so far pervious to water as to permit the greater part or even the whole of the rainfall to enter the earth where the water moves so slowly as to effect no damage through the removal of the soil material. Even where the deposit is of such a clayey nature that the rain does not freely enter the earth, the innumerable bits of stone

which it contains act as obstacles to the erosive work which is accomplished on ordinary soils. On nearly level areas, where the inclinations may not exceed one or two degrees of declivity, the water which gathers on the surface moves so slowly that its scouring action is relatively slight. On the alluvial plains, owing to their slight inclination and generally porous nature, there is likewise an exemption from this class of injuries. The evil of excessive erosion is most marked in the districts lying to the south of the Ohio and the Potomac, where all the district except that occupied by the alluvial deposits is commonly underlaid by a compact earth which does not readily take in the rain water, and which, from its prevailingly fine-grained character, is readily washed away in times of heavy rain. In every county in this district we may find more or less evidence that this process of soil destruction is rapidly going on. Wherever the earth has been tilled for a decade or more we observe that the upper part of each inclined field is already impoverished by the process. For a time the soil washed down from the elevated ground may serve in a measure to fertilize the lower parts of the area. Gradually, however, the zone in which this pauperizing process has had a decided effect descends the hillside until all the surface down to the level of the alluvial plain has become too poor to repay tillage.

Although the greater part of this Southern field has been under cultivation, on the average, for less than half a century, the depreciation of the soil is already of moment, and has begun to affect the economic value of the country. In that district not less than five thousand square miles of what was originally very fertile land has been abandoned because of the impoverishment which this careless agriculture brings about, and perhaps ten times that area has seriously suffered from this action. Another century of such reckless tillage will reduce a large part of the upland district of the South to the state of much of the land about the northern shore of the Mediterranean, where, over wide stretches of country, the shiftless methods of former ages have led to the destruction of the soil.

Although a portion of the damage which rain inflicts upon the soil which lies on steep slopes is inevitable wherever they are submitted to plow tillage, a large part of the loss may be prevented by the simple device of deep plowing. Where the soil is overturned to the depth of only six inches it may be unable to take into its interstices the rainfall of a heavy shower, and so during a

torrential fall the whole of the layer may slide down the slope with exceeding rapidity. On the other hand, if the tilth have a depth of ten or twelve inches, all the water may be stored in the open-textured layer and be only gradually yielded to the streams. In general, however, the only way to prevent this depreciation of the highly inclined fields is by retaining them as pasture land, for which use they are generally well fitted; or, if they must be plowed, by planting them with those crops, such as the small grains, which protect the surface during their growth, and after harvest leave a thick-set stubble to arrest the swift motion of the rain water. In general these highly inclined areas near the hilltops had best be preserved as forests. The total area of these grounds is probably not greater than is required for the supply of the timber which is demanded in this country, and the effect of these forest tangles on the hilltops is to retain moisture in the dry seasons, and to yield it gradually to the tilled ground at lower levels. To note the advantage which may thus be gained, the reader has only to observe the difference in the character of the crops on two hillside fields whose conditions are alike except that the one has a forest above it and the other is tilled to the top of the ridge.

The only remedy for this evil which menaces the productiveness of our soils in a large part of this country is to be found through the development of a sound public opinion which sternly reprobates all waste of man's great inheritance, a store which should be transmitted unimpaired from generation to generation. When men are made to feel that it is a crime to permit the soil which is in their keeping to fall below its best estate; when, moreover, they feel it their duty to transmit their fields in a condition at least as good as that in which they received them from Nature or from their ancestors, this shameful waste will cease. Already there are many signs which indicate the development of such a public sentiment. Thus, in a large part of the South, where cotton is grown on hilly land, the practice has recently been introduced of making benches on the slopes, which arrest or at least restrain the downward motion of the water in times of heavy rainfall, and thus protect the surface from the worst evils which we have described. With the advance in the price of land we may expect that such care will be continually increased.

There is another though less serious evil which American agriculture has encountered in the past, and which still in many districts operates somewhat to limit its success. When our forefathers first came to the fields of this continent they brought with

them a number of species of plants and animals which had developed under the conditions of the Old World, and were especially adapted to the peculiarities of the soil and climate of that country. With them they also brought a body of traditions concerning methods of tillage which had been developed during centuries of experience in northern Europe. Fortunately, the state of the soil and climate of North America was on the whole well suited to the growth of the greater part of these domesticated creatures under the same care as had been given them in the Old World. The general environment of organic life on the Atlantic seaboard is so like to that of Europe, that no considerable departure as to the crops which were tilled or the methods employed in their care was necessary to make the agriculture of the New World tolerably successful. In proportion, however, as our population has penetrated to the interior districts they have come to possess fields where the soil and the seasons have been ever more and more peculiar and unfitted for the conditions of their domesticated creatures or the care which they have been accustomed to give them. Experience has shown that it requires much time and persistent effort intelligently pursued in order to develop varieties of most of our plants, and of some of our animals, so that they may just suit the conditions which the interior parts of the continent present. A striking instance which may serve to show the reader something of these needs is exhibited by our Indian corn. The variety of this plant which is tilled in Alabama requires so long a time for its grain to mature that it is unfit for cultivation in northern New England or the Canadian Dominion; but by a careful system of selection and acclimatizing, a modification of the species has been made which suits the Northern conditions, for it will mature the seed in a hundred days from the time it is planted.

Although the above-described instance of the variation which it has been necessary to bring about in order to fit maize for the use of the Northern farmer is the most conspicuous which can be adduced, similar variations have been or can be advantageously established in the case of many other species. Along with these variations in the habits of the cultivated species there has necessarily to go changes in the system of tillage which is applied to them. The result is, that when a new portion of our frontier is occupied there is apt to be a period of rude and painful experience in which there is a frequent loss of crops, leading to the impression that the area is more or less unsuited to the needs of agriculture. After a time the culture becomes more or less reconciled

to the environment, and the people become more hopeful of their future. It is doubtful, however, if the adjustment of our crops as regards their constitutional varieties or the methods of cultivation is in any part of this land so complete as it is in the fields of Europe: throughout the Mississippi Valley it seems to the present writer quite clear that this accord between the physical state of the country and the subjects and methods of tillage is still quite imperfect. Undoubtedly a large part of the future improvement in our farming methods will consist in the perfection of the relations between the products and usage of our fields and the nature of the country they occupy.

We have now to consider some of the peculiar successes of American agriculture and the reflex action which they have exercised on the development of this and other lands. These successes are numerous, and only a few of the most important can be here noted. They consist in part in improvements in the methods by which the work of the laborer has been done, and in part in the culture of plants which in this land were first brought to the service of man.

The first novelty in the way of method in the treatment of the soil which was instituted in this country was in the subjugation of the forest. In clearing away the woods, the custom was in Europe to hew down the trees, grub out the roots, and so to prepare the soil at once for the use of the plow. In practice this method was in this country found too expensive in labor. Therefore the early settlers betook themselves to a plan which they perhaps learned from the Indians. This was to strip away a ring of bark from the trees, which led in one or two years to their death, and immediately to such a loss of their leaves as would permit the sunlight to have access to the soil. Then in the dry season, burning over the rubbish of decayed vegetable matter which covered the true soil, they planted Indian corn, beans, and other plants which did not require the complete overturning of the earth in the interspaces between the roots. Gradually, after several years of imperfect tillage with the hoe, the decay of the roots permitted the plow to do its service. In the northern parts of the country the stumps of the trees were, after a year or two's decay, removed by means of levers and dragged to the margin of the field, where they were often used for fences. This innovation in the method of winning the forested tract to agriculture was made possible by the dry climate of our later summer and autumn, which made fire a valuable auxiliary in the work of clearing the

timber away, and by the existence of maize, a plant which the people obtained from the aborigines, which will yield a good return with but little tillage.

Perhaps the next important innovation due to the inventive skill of our soil-tillers is found in the method before described, by which the cranberry, a plant which was never systematically cultivated in Europe, has in this country been made the subject of a very high-grade cultivation. Other innovations may be traced, as in the culture of tobacco, a crop which was originally peculiar to this country; in the widespread planting of the small grains in the spring-time instead of in the autumn, as was the custom in Europe; and in many other less important details in the general management of fields. As a whole, however, the improvements which have been won in farming methods in this country consist in the application of mechanical contrivances to the processes of seeding, tilling, and harvesting of crops. The general use of horse powers for the work which follows the plowing and preparation of the soil for the seed is mainly due to the inventive skill of our people. The original ideas of many of these inventions have come from Great Britain, but their practical application to husbandry has been to a very great extent due to the peculiarly inventive mind of the Americans. It is indeed a most noteworthy fact, that all the valuable inventions which have served so greatly to diminish the demand for hand labor in tilling the soil owe their contrivance to the English-speaking people. Although a large part of all the mechanical devices which have served to ennoble our modern civilization are of English origin, the predominance of this race is particularly well indicated in the machines which pertain to the soil.

The innovations in the way of soil products which are due to this country, though not numerous, are of an interesting character, and have proved most important in the economical history of the whole world. The most noteworthy contributions consist of maize and tobacco, two plants which the early settlers found in use by the Indians and almost the sole object of their scanty agriculture. The corn of the Indians proved exactly adapted to the needs of the European immigrants. As before noted, it can be tilled in the half-destroyed forest; on soils of like quality it yields far more food than any other grain; it is easily harvested, suffers little from ordinary droughts, and the dried foliage is valuable for forage purposes. Therefore from the very first this plant has been the staff of our American life. Its use has spread to other

countries, and it is now the staple product of many areas in Europe and other parts of the world. Next to maize we must rank tobacco, which, although it has contributed nothing to the utilities of the world, nevertheless proved for many decades the most important product for exportation which this country afforded. The use of this plant has extended to every land, and has changed the social habits of many peoples. The potato and the tomato, though the ancestral varieties of each extended into North America, probably came to Europe from the southern continent of the New World. The wild turkey, our sole contribution to the domesticated animals of our race, was probably introduced into Europe from Cuba.

Among the innovative features of our American agriculture it will not be amiss to note the curious development of the cattle industry on our Western plains. From the beginning of the settlement of this country it has been a common habit of the people to make use of the unoccupied lands as ranges for horned cattle or sheep. Until within a few years a system of herding long prevailing on the island of Nantucket. The pasturage grounds were jointly held, each owner holding so many sheep rights, each of which gave him the privilege of maintaining one of these animals on the commons which belonged to the town. This system of joint holdings appears never to have had much extension on this continent, and is interesting only as a survival of the method of land tenure which is of great antiquity in the Old World; which, indeed, antedates the present method by which individuals hold a fee in the soil and other resources of the earth. Nevertheless, it has been the habit to consider all unfenced land as common property, so far, at least, as its pasturage resources were concerned. All government land has always been so used by the frontier people.

As forests have little value for pasturage, no account has been made of the unoccupied timber areas for this purpose; but shortly after the settlement of the Western plains began it became the custom to keep great herds upon these open ranges. Within thirty years the use of the lands on the Cordilleran plateau for cattle herding has been rapidly extended. At present about all of that area which is fit for this use is occupied by droves of cattle and flocks of sheep, and the greater part of the population in the district is engaged in this pastoral industry. As the herbage is very scanty, it is necessary, in order to maintain these flocks and herds, to keep them in almost constant motion. The

animals belonging to different proprietors become inextricably commingled, and often scattered over an area of thousands of square miles, so that it requires peculiar skill on the part of the herdsman to keep track of the beasts, and to assemble them at such times as may be necessary.

In many ways this peculiar ranching industry is a reversion to a lower state of agricultural employment than any in which our race has been engaged for many centuries of the past. Only in the northern part of the Cordilleran table-land near the Canada line is any care taken to provide this half-wild stock with a winter supply of food. In all, save a certain submission to their mounted guardians, they are in as primitive a state as their predecessors, the bisons of the Western plains. It seems likely that for an indefinite period in the future this rude but profitable industry will be maintained and to a considerable degree extended throughout the arid district of the West.

Although the territory where ranching is pursued is now very nearly stocked to the point at which it can profitably maintain these animals, it seems likely that, as before remarked, it is quite possible to increase the pasturage value of these poorly watered districts. This end can be accomplished by introducing into the territory a variety of the grasses such as grow on the plains of central Asia, the pampas of South America, and the arid districts of Africa and Australia. It is a well-known fact that the total number of species of these wild plants which can maintain themselves in a dry climate and afford there desirable forage is very great. Probably not more than one tenth of these forms which are valuable in arid districts now exist in the Cordilleran field. Owing to the fact that all the region in and about the Rocky Mountains was not long ago the seat of an abundant rainfall, the plants of this region have had scant time to adapt themselves to the relatively new conditions of the climate. In several other parts of the world it is tolerably clear that the aridity has continued for a greater time, and we may therefore expect to find in those districts plants suitable for pasturage purposes which will attain a more luxuriant growth than any of our own species.

It is a well-known fact that even on our highly cultivated meadows and better pasture lands it is profitable to have several species of grasses growing together. The yield of the soil is thereby increased, and the crop seems to be, at least in its green state, better suited to the joint consumption of sheep and cattle. We may expect the same principle to hold when the species of

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grasses within our arid districts are increased in number: particular forms will suit particular situations, and the land as a whole come to bear a denser mantle of vegetation. In the choice of plants for the improvement of the forage in the Cordilleran district we are not limited to the grasses alone. There is a host of species belonging to the family of the *Leguminosæ*, or the kindred of the peas, and the locusts, which tolerate rather arid conditions and at the same time yield nutritious food for herbivorous animals. There are probably in all not far from a hundred different kinds of plants belonging to foreign lands which are likely subjects for this experiment in their acclimatization. The project seems attractive, not only on account of the immediate results in the way of gain in the pasturage which may be through it attained, but also because any considerable increase in the growth of vegetation in this arid district would be likely somewhat to modify the dryness of its climate. If plant growth enough could be brought upon the soil to retain the rain water which falls at certain seasons of the year for any considerable time during the more arid terms, the result would probably be a perceptible increase in the rainfall of the region. A portion at least of the water so kept from the streams would pass into the air and return again in the form of rain. Even if no increment of the rainfall were brought about, the value of the streams for irrigation purposes would be enhanced by their somewhat more continuous flow in the drier part of the year.

The most remarkable feature in the agricultural history of North America is found in the singular extension which it has given to the English race both in this country and in Europe. The resources of American soil have gone far in making it possible for the English-speaking people in the course of a century to advance to a position in which they now dominate the earth. They have, indeed, secured in a substantial way to the kindred states on either side of the Atlantic a place in human affairs which has never been held by any other kindred population in the world. The commercial effect of this agriculture is not limited to the English.

The influence of American agriculture upon that of Europe has been considerable, and is destined in the future to be greater than in the past. We have furnished to the Old World from the aboriginal store of the New Indian corn, the potato, the tomato, and tobacco, all four of which vegetables have come to play an important part. Valuable as are these vegetables, we owe

far more than we have repaid to the lands over the sea in the way of cultivated plants. When we consider, however, the extent to which the soil products of America have served to provision the population of Europe, we perceive that we have in a measure repaid our ancestral debt to them. At the present time the shipments of food from this country to Europe are so great that the peoples of that continent could not maintain themselves in their present condition were they cut off from the products of our American fields. The great manufacturing centers of England, Belgium, Germany, and France can not at the present time be provisioned from the territories of those several states. Even in their years of plenty many millions of their people would be reduced to starvation were it not for the grain products of our Western fields; and in times of dearth, such as come upon the eastern portions of the Old World last year, widespread famine can only be avoided by access to our American granaries.

Since the development of cotton culture in the United States the people of the civilized world, and a large part of those in barbaric and savage countries as well, have come to depend to a great extent upon clothing made from the fiber of this plant which has grown on fields in the southern part of the United States. Although cotton is extensively reared in India and in Egypt, and develops well in many other parts of the world, there seems to be no land except our own where the conditions of soil, climate, and of society make it possible to produce it in sufficiently large quantities to supply the demand of European mills. Even during the period of our civil war, when our product was only about half as great as at present, a partial interference with the exports from this country brought about disastrous disturbances in the manufacturing and commercial interests of Europe.

To those who speculate on the danger of war between this country and the greater states of the Old World, it is a sufficient answer to say that at present, and for many years to come, we have a firm bond of peace with those peoples which is well guaranteed by their necessities. Any disturbance which would lead to a general nonintercourse with European states, or which might compel us to a cessation of commercial relations with the Old World, would quickly force a peace on the basis of their imperative needs. While we would be greatly distressed by such a rupture of commercial relations, we should by no means lack for food or the other necessaries of life.

It is by no means certain how long the North American continent will continue to afford to other parts of the world this great share of its soil products. There are two reasons why we may expect in the near future to see a progressive and rather rapid reduction in the amount of our exportable crops. In the first place, the grain lands of this country are, as experience has shown, subject to a rapid depreciation in the amount of their annual yield. In general, thirty years of tillage reduces the return of grain by at least two fifths; so, as far as this most important source of supply is concerned, the depreciation in the value of the soil alone appears likely to diminish the surplusage which may be used for exportation. Moreover, the population of this country is rapidly increasing, so that in another generation, except for the resources which may be won from our swamps and arid lands it appears doubtful whether our grain supply will greatly exceed the local demand. The condition of our tillage as regards the tobacco crop appears to be even more serious. This plant is exceedingly destructive to the land. Experience seems to show that the tax put upon it is greater than in the case of any other crop. A large part of the area in Virginia, Maryland, and North Carolina, which afforded the supply of this product in the last century and in the first part of this, no longer gives remunerative returns. Unlike all our other crops, tobacco can not be advantageously reared by the use of artificial fertilizers. The product of fields which are thus refreshed is of an unsatisfactory quality. The only tillage crop of this country which seems likely to afford a continued increase of exportable material for some decades to come is cotton. Probably not more than one third of the area which is suited to the needs of the plant is now in cultivation, and by a free use of commercial fertilizers, which add to rather than diminish the quality of the crop, it will probably be possible to increase the aggregate product to at least threefold the quantity which is now produced.

It is an interesting fact that during the last fifty years, particularly in the last two decades, American agriculture has profited more by governmental aid than that of any other country. The Federal bureau for the dissemination of information, and the many agricultural colleges and experiment stations which have been founded by the Washington authorities, have provided the people with a free access to scientific knowledge and the experience which has been gathered from other countries in a singularly effective way. There is reason to believe that this great work is

but in its beginning, and that in the century to come we shall find in this country a body of agriculturists more skillful in their use of the resources of the soil and more careful of its well-being than those of any other country. Probably the greatest economic revolution which the youth of to-day may in his old age behold will be found in this all-important branch of our industries.

CHAPTER VIII.

MINERALS AND MINING.

At many points in the foregoing discussions concerning the relation of man to the continent of North America it has been necessary to refer to the work which, during the olden days, the natural forces have done upon this land. It is a peculiar feature of our modern science that it becomes ever more and more necessary in the advance of learning to explain the living moment by the dead past. This method of consideration, which is peculiarly characteristic of our own time, has not only an intellectual but an economic importance. From the point of view of learning men may profit greatly from the study of the past, for such inquiry vastly extends their understanding of their place in the world, and by enlarging the perspectives of thought gives a dignity and beauty to the history of man and the fields he inhabits which can be attained in no other way. On the other hand, through a comprehension of the events which have taken place in the development of any land, the men who dwell in it are able, in a systematic way, to avail themselves of the economic resources which are stored in the depths of its earth, or which are contained in the soil.

The fitness of the earth to produce crops depends upon the character of the rocks which have afforded the mineral matter of the soil, or upon the nature of the forces which have acted to bring these materials into the position where they may be taken into the bodies of plants. The coal which is won from the depths of the earth owes its development and preservation to events which took place in remote ages. The plants which formed it were fostered by the ancient sunshine; the swamps in which the peaty matter was preserved were due to the conditions of the geography and the climate of those vanished days. The burial and preservation of the peat were brought about through the deposition of strata upon the old morasses. When we burn the fuel we avail ourselves of energy which has been husbanded through age-long actions. Thus the power of our engines, the

productiveness of our fields, the mineral wealth of the deeper earth, all have a history which extends far into the past, and which must be understood by those who would win the profit of thought and action which they may afford.

So far we have been considering the physical conditions of the America of to-day with reference to the present needs of our people and the possibilities of their immediate future. We must now endeavor to extend these perspectives by a study of the mineral resources of the country. To do this task in a satisfactory manner it will be necessary for us to trace, at least in a general way, the process by which the continent has come to its existing state and has become the storehouse of vast subterranean wealth. Anything like a complete description of the successions by which this continent has attained to its existing condition would be a task which would far transcend the limits of this work. It would indeed require as much printed matter as is contained within the pages of these volumes. It will therefore be necessary for us to limit the inquiry to those features which have an immediate and evident relation to human affairs, omitting as we go the vastly more extensive phenomena which, though in a way related to the interests of mankind, are not of clear and dominant importance.

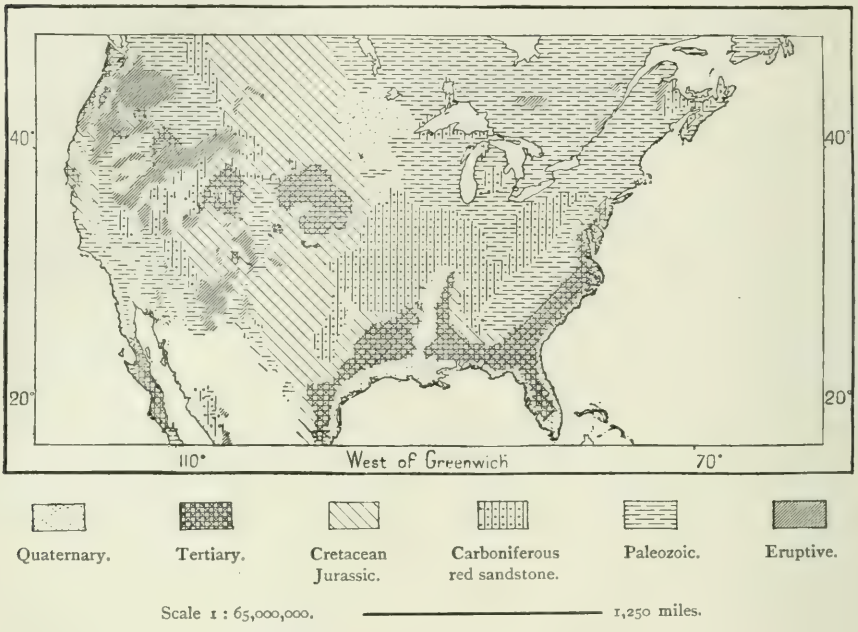
Although the mineral resources of any continent are apt to be distributed through the rocks of divers ages, formed between the beginning of the earth's history and the present day, it is a noteworthy fact that the greater part of these resources are commonly stored in the more ancient formations. In most cases the actions which lead to the development of mineral veins and other deposits of valuable ores require a long time, and the process by which they are produced and revealed at the earth's surface can only be accomplished in the course of ages. Therefore, in our account of the development of the resources of North America it will be necessary for us to begin the story in the very remote periods before this great land had assumed the character of the continent, when it was an archipelago of scattered islands lying in the midst of a widespread ocean.

The remotest age in which we have succeeded in tracing something of the history of North America is known as the Laurentian time. This period in the development of our sphere has left us but faint trace of its conditions. We know that there were seas and lands, but little is ascertainable concerning their limits. So far as North America is concerned the evidence enables us only

to discern that in the part of the world now occupied by the continent the process of rock-making was going on upon the ancient sea-floor. This process indicates the existence of some land areas in this portion of the earth's surface from which sediments were derived and accumulated on the floor of the sea. Strata of this age are still preserved in a considerable area north of the St. Lawrence and to the east and west of Hudson Bay, as well as in the Adirondacks, at several points in the region now known as the Appalachian Mountains, and in the Cordilleran district of the continent. All these ancient sediments have been greatly changed by chemical actions brought about through the agency of water and heat; all have been buried at one or more times beneath subsequently formed deposits, and this to a great depth, so that they have been exposed to the alterations which are brought about through the high temperature of the earth's interior. Instead of sandstones, slates, conglomerates, and other forms of ordinary sedimentary strata, the beds now appear as crystalline rocks, as gneisses, mica schists, or granite. So great have the changes been which have occurred in these rocks that none of their fossils have been distinctly preserved, and we are left in complete uncertainty as to the character of the organic life which dwelt on these ancient lands and within these olden seas of the Laurentian age.

At the close of the Laurentian age the beds formed during that time which are known to us appear generally to have been lifted above the ocean's surface and brought into a condition of dry land; not in the shape of a continuous continent, but as detached islands, which by their position foreshadowed in a way the future shape of North America. In this second period, commonly known as the Cambrian, the heart of the continent was indicated by large isles in Canada and the Adirondacks, by smaller and probably elongated islands in the Appalachian and Cordilleran districts, and perhaps by smaller areas of land in the region of the Ozark Mountains. The detritus worn by sea and rain from the islands of the North American archipelago, together with the limy and other organic matter taken by the animals and plants from the sea and air, was built into strata of the Cambrian age. This age was long, and the beds formed during it often have an aggregate thickness of ten thousand feet or more. Though considerably altered by the agents of change, and sometimes, like the Laurentian beds, metamorphosed into gneisses or mica schists, these Cambrian strata very frequently preserve their fossils in a recognizable form. From these organic remains we know that

the seas of that time contained very numerous species of animals and plants, all of which differ much from the existing forms, and many of which belong to families and even orders of life which have long since vanished from the earth. So abundant were the



Geological formations of the United States.

shellfish, the crustaceans, the worms, and other forms which separated lime carbonate and lime phosphate from the water of those ancient seas, that very thick deposits of a limy nature were laid down—beds which at the present day, owing to the character of the organic remains they contain, afford excellent soils. It was to the great accumulation of these Cambrian strata which in the ancient days overlaid much of the area of the Laurentian rocks that these last-named strata owed, in part at least, the great chemical changes which they underwent—changes which served to develop the veins or lodes of lime phosphate, galena, zinc, copper, lead, and the more precious metals. In part these changes are due to later ages, but there is reason to believe that it was to a considerable extent brought about in this very ancient time, which can not well be reckoned at less than a hundred million years from the present day.

Although the geography of the earth and the character of its

inhabitants were both very different from those we now find, there is every reason to believe that in all other regards our sphere was much the same as now. On some of the ancient beaches of the later Cambrian time we may note where the reflux of the tide left the smooth sands bare and impressible, and on the surface the rain-drops fell during a brief shower. Into the little pits formed by the falling globules of the passing shower the wind swept dry sand, so that the molds were preserved and buried beneath the subsequent accumulations which were brought by the currents and laid over the surface where the prints were made. So perfect is the preservation, that these fossil raindrops are as clear as if they were recently buried. The changes of the seasons, the ocean currents, the great movements of the air, were all in that day doubtless what we find them at present, differing in the details of their action, but indicating that the great climatal mechanism which determines the fitness of our earth for the uses of organic life was already established.

The next great geologic age, that of the Silurian, was ushered in by a further uplift of that part of the crust on which the continent of North America has been built, and through this movement extensive areas of the sea bottom on which the sediments of the Cambrian age had accumulated became dry land. Most of the islands which constituted the germs of the continent had their areas widened by this uprising. The Silurian time is notable for the fact that in it we find the lowest forms of backboned animals. A recent discovery made by Mr. C. D. Walcott, of the U. S. Geological Survey, shows us that the fishes somewhat related to the gar pikes occur as low as the beds which were deposited shortly after the close of the Cambrian time. Hitherto these finned creatures have not been known below the base of the Devonian section, but this discovery shows us that in what is now the Cordilleran district of North America the ancient seas contained many fishes of high grade, and this fact makes it probable that these backboned animals existed in some part of the world as early as the Cambrian time. In the Silurian, for the first time, we find evidence that there was animal and vegetable life upon the land. This proof comes to us in the shape of rare fossils found in the valley of the Ohio and in Scandinavia, which preserve the remains of an insect related to the scorpion. A few plant fossils show us that the lands were occupied by a growth similar to our lowly ferns. It seems almost certain that at this time there were none of the higher true-seeded plants in existence.

Owing to the fact that the animal and plant life of the seas was more abundant and more varied in the Silurian time than in the earlier ages, the rocks of this section are more prevailingly limy and afford richer soils than those formed on the beds which were laid down in the Laurentian and Cambrian periods. The most productive fields of North America and some of the richest of the Old World lie upon the Silurian rocks. Thus the marvelously fertile soil of central Kentucky and of the neighboring portions of Tennessee and Ohio owe their great grain-producing capacity mainly to the lime phosphate which they derive from the decaying remains of the fossils contained in the underlying rock. Where the beds of this age have been subjected to a considerable amount of metamorphism, so that mineral veins are formed, these deposits are apt to contain notable quantities of gold, together with the ores of silver and lead. Some of the most extensive deposits of the above-named metals in this and other continents are contained in the Silurian strata. It is probable that this considerable store of the rarer metals was built into the ancient strata by the action of certain sea-weeds, which separated the substances from the waters of the ocean and accumulated them on the old ocean bottom.

During and at the close of the Silurian time the vast arch of North America swayed upward yet farther above the surface of the sea, its islands were enlarged, and, although there was as yet no distinct continent above the ocean level, the islands formed by its higher parts appear to have become much larger than before. Then followed the long successive stages of the Devonian period, during which over wide areas the seas appeared to have become shallow. The presence of neighboring lands is marked in the marine strata by a rapid increase in the number and variety of fishes, and by the frequent occurrence of fossil insects which clearly dwelt upon the land. In the higher strata of this age we find numerous ferns which indicate a tolerably high development of these vegetable forms; in many of the rocks we find evidence of strong current action such as can only have been brought about in shallow water. All the evidence points to the conclusion that the greater part of the surface was now in general at no great depth beneath the sea; that it was ready, in fact, to pass from its ancient condition of an archipelago to the more elaborated state of a true continent. At this stage of its development North America was mostly covered by the ocean. Between the emerged lands of the Appalachian district, which now consisted

of a few great islands and the island belt of the Cordilleras, there was a wide sea. From this basin there appears to have been water communication with the Arctic Ocean, probably through the space between the great Laurentian land and the northern Cordilleras, though there may have been a passage through the region in which now lies the river St. Lawrence.

In the middle portion of the Devonian age we find evidence which leads to the conclusion that a great marine stream, probably the equivalent of the current which now sweeps from the Gulf of Mexico into the north Atlantic, passed over the central portion of the North American field. It is likely that this path of the equatorial current was established as early as the lower portion of the Silurian age, and continued to be traversed by the tide of warm waters until the time of the coal measures. The evidence of this movement is afforded by the existence of numerous coral reefs which in the olden time as well as at the present day could only develop where a current of warm water struck upon a shallow or a shore. In the region of the Ohio Valley and in the neighboring portions of the Virginias, Pennsylvania, and New York, the Devonian section contains a thick bed of dark shales commonly known as the Devonian black or the Ohio shale—a deposit which is supposed to have been formed beneath a sea abundantly charged with floating algæ in the manner in which we now find the Sargasso Sea of the Atlantic to be occupied by floating gulf weed. It is probable that at this time the Gulf Stream swept away toward where the Rocky Mountains now lie, and that this sea weed of the Devonian time occupied a portion of the ocean to the east of its tide, the place being exactly comparable to that which the weed-laden waters now hold in the existing Atlantic.

The Devonian time shaded upward into the Carboniferous age by rather insensible gradations, during which the seas appear to have become shallower, but they were still swept over by the warm currents, as is indicated by the rich and varied life which they contained. Finally, the upward growth of the continent converted a vast region which had hitherto been a sea bottom into dry land, and the great coal-making age began. In this age the greater portion of the Mississippi Valley, probably nearly all the area now drained by the rivers which fall into the great river above the mouth of the Ohio and including the valley of the last-named stream, became elevated to a slight height above the plane of the sea, and at the same time a broad belt along the Atlantic coast north of New York appears to have shared in the upward

movement and been converted into a strip of low-lying plain. At this time the Alleghany Mountains had not been formed, so that the great continental plain extended from the foot of the Blue Ridge westwardly to near the base of the Rocky Mountains and northwardly to central Michigan. Its southern margin lay at least as far south as southern Alabama. This great change, which we may indeed term a revolution in the history of the continent, was suddenly accomplished, but it had been in course of preparation during the long ages in which the originally deep waters which covered the continent were gradually shallowing as the great arch rose toward the surface.

As soon as the broad plain lands of the continent were lifted above the level of the sea they were occupied by an abundant growth of ferns, "horse-tails," and rushlike plants which had been gradually developing their peculiarities on the ancient islands, and were now ready to make a conquest of these lowlands and to perform a part in the earth's economy which has been of the utmost importance to man. The new-made portions of the area not having been elevated much above the level of the sea, and being as yet unaffected by the mountain-building forces, had an imperfect drainage. It was the habit of the plants which then existed to grow in close-set order, much after the manner of the mosses in our modern swamps. They were all well fitted to attain their best development in marshes, many of them had imperfect roots, and nearly all of them could flourish with their bases below the level of fresh water. The air at this time appears to have been very humid and the temperature prevailingly mild. Under these conditions the newly emerged continental plain became occupied by vast morasses.

It is a well-known characteristic of swamps that the woody matter which accumulates in them does not undergo the complete decay which is the fate of the leaves and branches beneath a forest, but is converted into a soft black material known as peat or muck. The other conditions necessary for the completion of the process by which the vegetable matter was converted into coal were brought about by the singular up-and-down movements of the land during this age. These swayings of the land appear to have been unusually frequent and sudden during the time of the coal measures. The result was, that after the peat bogs were formed on the newly emerged lands the areas they occupied were depressed below the water-level. While thus lowered extensive sheets of clay, sand, and gravel were laid down upon the swamps.

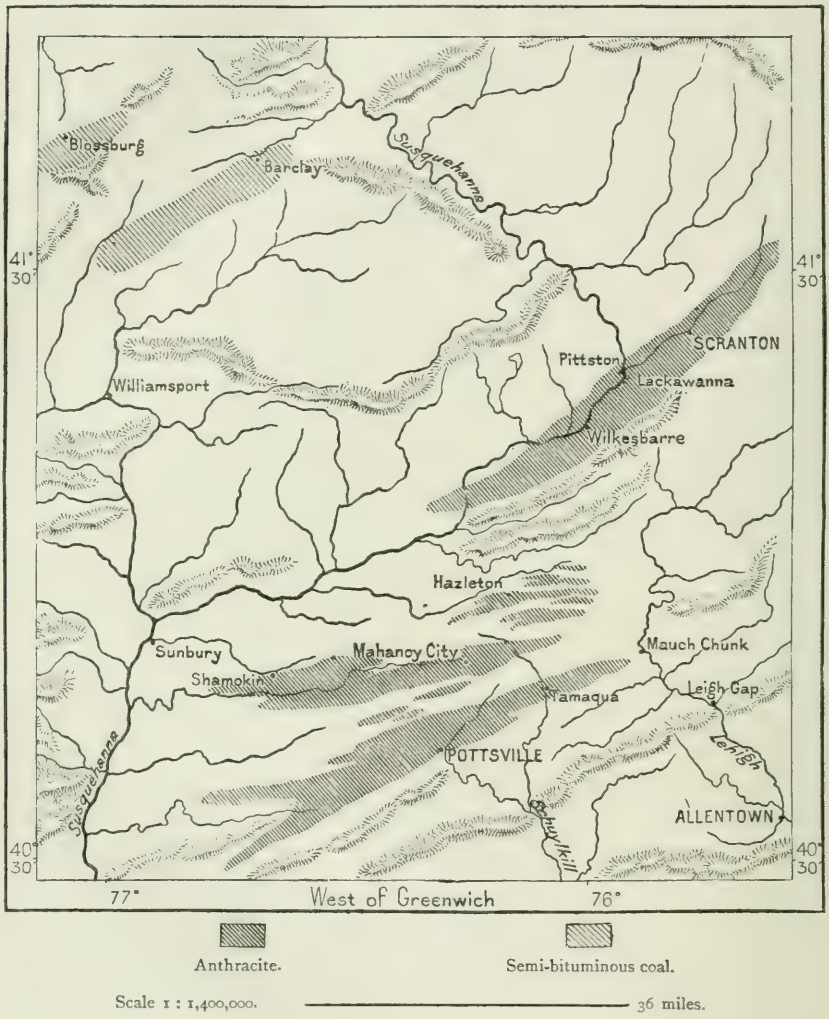
Natural bridge of silicified wood.

After a brief submergence the area was again uplifted and another accumulation of vegetable waste came about, which in turn was lowered beneath the waters. In this manner thousands of feet in thickness of strata were accumulated which contained scores of coal beds, many of which were of such depth that even after they had been compressed and shrunken from the changes which took place in them in their buried state remain of sufficient thickness to be worked by the miner.

After peaty matter is inclosed in the rocks in the manner above described it has to undergo important changes before it is brought into the state of good coal. While it remains unburied, although it will afford a burnable material, it is almost valueless in the arts, for the reason that it contains an excessive amount of water and yields a considerable part of its weight in gases which have little heating value. Fortunately for the interests of man, the chemical and mechanical qualities which act on the rock-inclosed peat are admirably suited to bring the material into the shape suited for use in the arts. The pressure of the overlying rock combined with the gases which are generated in the coal force out the excess of water and consolidate the original open-structured mass to a fraction of its original thickness. Chemical changes, which slowly operate, but which in the ages prove very effective, remove the volatile materials to a greater or less degree, and so increase the value of the deposit for use as fuel. We may in this country trace every stage in this process of change by observing the condition of the buried peat swamps formed during the ages from the present day backward and downward to the base of the carboniferous strata. The newer coals, which are commonly known as lignites and which abound in the western portion of the United States, have only undergone a part of the preparation which is necessary to give them their best form. The ordinary bituminous layers of the coal measures, though further advanced in their preparation, having been greatly consolidated and having lost much of their volatile carbon, afford better fuels. The anthracites represent a more advanced state in the process of change; there the fixed carbon constitutes by far the larger part of the mass.

It is interesting to note that in certain rare cases the change in the coal carries it somewhat beyond the burnable point, and converts the carbon into a state in which it resembles graphite, which is familiarly known as the so-called lead of pencils, a substance so far unburnable that it is used in making crucibles which have to

withstand the heat which will melt almost all the metals. It is most fortunate for the interests of man that this extreme change



Anthracite region in Pennsylvania.

which coal may undergo when buried in the rocks occurs but rarely. In the Narragansett basin alone, a coal-field lying in southern Massachusetts and Rhode Island, do we find this change in coal which transforms the material into a graphitic substance, so far advanced that the burnable value of the material is seriously diminished.

The advance of life during the Carboniferous period, as in the earlier ages, went forward rapidly both on the land and in the sea. The most notable additions consisted in the development of certain backboned animals allied to the water-dogs and salamanders which inhabited the swamps in which the coal beds were formed. These batrachians are particularly interesting for the reason that they were the first animals above the grade of the fishes, and afford the bridge over which the vertebrate life passed from its lowly state in the waters to the higher organization of its land forms.

Up to the close of the Carboniferous period the organic life of this country, at least since the Cambrian time, had been subject to no widespread and sudden alteration. Various groups of animals and plants—the tenants of land and sea—were created, spent their time upon the earth, and passed away; but although the separate threads, as we may term these species, disappeared, the garment of life was continuously woven into a united fabric. At the close of the coal measures, owing probably to extensive alterations in the geography of North America and the neighboring lands, a great and sudden change appears to have occurred in the vital conditions of this continent. On this account geologists are agreed in regarding all the ages, from the Lower Cambrian to the summit of the coal measures, as belonging in one great field of the earth's history to which they give the name of the Palæozoic time, which, being translated, means the age of ancient life.

From the point of view of human interests this first great division in the history of North America may be considered as a time of preparation, during which the continent was organized and was made the storehouse of many substances of value to civilization. In the rocks which were formed during this time are contained the greater part of the mineral substances which now serve our arts, and which in the future are ever to be of greater and greater value as the material bases of our social organization. First among these accumulations of mineral wealth which were formed during the Palæozoic era we must reckon the deposits of burnable carbon. Although some useful deposits of fossil fuel were produced in later stages of the continent's history, all the most important accumulations of this nature are contained in this more ancient group of rocks.

The fossil fuels of the Palæozoic strata are naturally divided into three groups—the coals, petroleums, and natural or rock gases. The first of these are by far the most important, and prom-

ise to be the most enduring sources of readily available power which the land affords. All the beds of this nature which have any economic value were formed in the very last portion of this era, in the relatively brief time known as the Carboniferous period. Owing to the fact that the plain lands of North America which were uplifted at the beginning of the coal-making age were very extensive, the area of Carboniferous rocks in North America is greater than those which are exposed on any other continent. The total supply of coal which they may afford is so large that for at least a thousand years to come there is no reason to apprehend its exhaustion. Moreover, the fields which it occupies are excellently well placed for convenient use in the arts. Probably no place on the habitable section in the eastern half of North America, north of Mexico, is more than five hundred miles removed from burnable coal. The western portion of the continent is in this regard less well situated, but even there Nature has provided a considerable store of fossil fuel, though the deposits in part belong to later stages of geological development.

The next most important form of fossil fuel is that which presents itself in the complicated substance known as petroleum, or rock oil. This material, though appearing in the form of a fluid of apparently simple composition, contains a great variety of substances which either in their original or artificially changed condition enter into the arts in a great variety of forms. Besides the several grades of illuminating material, such as kerosene, naphtha, and the lubricating oils, paraffin, a host of dyestuffs, the unguent known as vaseline, and a number of materials of value in medicine and the other arts are obtained from the fluid. Each year sees more or less addition to the variety of these materials which are produced from rock oil, or readily compounded from the substances which it contains. No other material which has entered into the arts in modern times has proved anything like as serviceable to man. It is much to the credit of our American folk that the use of petroleum has been substantially due to their enterprise, for, although the substance was known to the ancients and has long been used in a local and unimportant way in parts of Asia, its place in the arts was secured by our own people.

While the deposits of coal owe their formation to the accumulations of vegetable matter in ancient swamps and their subsequent modification within the rocks, those of petroleum were probably due mainly, if not altogether, to animal matter which was deposited on the sea-floor at the time when the middle Palæozoic strata

were formed. When the remains of animals are entombed in the rocks they rarely if ever form layers composed altogether or in the main of decomposable organic matter. Generally this organic material is commingled with sand, clay, or limestone, those mineral substances constituting the greater portion of the mass. We early note the fact that the buried vegetable matter of a coal seam undergoes a slow chemical change attended by the release of gases. A similar alteration appears ordinarily to take place in beds which contain animal matter with the result that the material gradually passes into the state of the substances known to chemists as volatile hydrocarbons, a part of which take the form of gases, while another part remains in the fluid state. In rare cases waxy materials or asphalts are the products of such chemical change. The forms of animal life which abound in the seas in which the strata of Silurian and Devonian times were laid down appear to have been of a nature to provide these rocks with a remarkably large amount of organic matter fitted in time to become converted into petroleum. At the same time the strata of these ages being here and there porous, and having been generally deeply covered by the strata of later age, have retained a certain portion of the oil which otherwise would have gone away through the springs to the air, where complete decomposition would have awaited it. In between the porous layers of the sandstones which have afforded the storage places of the petroleum there are many layers of impervious rocks which serve to retain the fluid, even though it be impelled to fly away to the surface under the great pressure of the gases which it contains.

Production, Value, etc., of Crude Petroleum in 1889, by States.

States.	Illuminating.			Lubricating.		
	Production.	Value.	Average per barrel.	Production.	Value.	Average per barrel.
Pennsylvania and New York	*Barrels.* 21,393,159	$23,225,453	$1 08⅝	*Barrels.* 94,276	$249,710	$2 64⅞
Ohio	317,037	340,683	1 07½	1,240	10,334	8 33⅜
West Virginia	520,511	595,730	1 14½	23,602	58,097	2 46⅓
Colorado	316,476	280,240	0 88½	.....	.....	.....
California	97,264	121,684	1 25⅛	.....	.....	.....
Indiana	.....	.....	.....	.....	.....	.....
Kentucky	5,400	5,400	1 00	.....	.....	.....
Illinois	.....	.....	.....	1,460	4,906	3 36
Kansas	.....	.....	.....	500	2,500	5 00
Texas	.....	.....	.....	48	340	7 08⅓
Missouri	.....	.....	.....	20	40	2 00
Total	22,649,847	$24,569,190	$1 08½	121,146	$325,927	$2 69

States.	Fuel.			Total.		
	Production.	Value.	Average per barrel.	Production.	Value.	Average per barrel.
	Barrels.			*Barrels.*		
Pennsylvania and New York	.....	.....	.....	21,487,435	$23,475,163	$1 09½
Ohio	12,153,189	$1,822,978	$0 15	12,471,466	2,173,995	0 17⅜
West Virginia	.....	.....	.....	544,113	653,827	1 20⅛
Colorado	.....	.....	.....	316,476	280,240	0 88½
California	205,956	234,364	1 13¾	303,220	356,048	1 17⅜
Indiana	33,375	10,881	0 32⅝	33,375	10,881	0 32⅝
Kentucky	.....	.....	.....	5,400	5,400	1 00
Illinois	.....	.....	.....	1,460	4,906	3 36
Kansas	.....	.....	.....	500	2,500	5 00
Texas	.....	.....	.....	48	340	7 08⅜
Missouri	.....	.....	.....	20	40	2 00
Total	12,392,520	$2,068,223	$0 16¾	35,163,513	$26,963,340	$0 76⅝

In order to bring before the reader's mind the delicate nature of the adjustment of the natural forces which have provided the under earth with valuable mineral stores, we may note the fact that the abundance of these rock oils in America is due to the relatively undisturbed state of these old Palæozoic deposits. In other countries the rocks of similar antiquity have commonly been rent by numerous fractures or faults and upfolded into mountain chains. Where these accidents have occurred the stores of oil have always escaped, and the beds in which they were formed may not contain a trace of the material. If North America had been mountain-built in the same measure as the European mountains, it would have been denied its resources of fluid and gaseous fuel. As it is, only in one district of the world, so far as known —viz., in the Caspian field of Asia—is there a store of rock oil comparable to that contained in the eastern portion of the Ohio Valley.

The same chemical and physical conditions which bring about the formation and preservation of petroleum commonly lead to the storage in the rocks of a quantity of burnable gas. Some burnable gas is produced during the changes which coal undergoes in its alteration from the state of peat to the condition of bituminous or of anthracite coal. In many mines this gas escapes from the face of the bed into the open air with great energy, making a hissing sound as it passes out through the crevices into the air of the mine. In its nature it is essentially like our ordinary burning gas, and, like that substance, will, when combined with air, explode in a violent manner. In no case, however, is this emanation from coal found stored in sufficient quantities within the rocks to afford valuable fuel.

The amount of this store of burnable carbonaceous substances —coal, petroleum, and rock gas—contained in the strata of North America is, as regards the several classes of material, extremely varied. The coal is certainly, as measured by its fuel value, in quantity at least a hundred times as great as the other burnable materials, and may be regarded as practically inexhaustible. The store of petroleum is far more limited, both as regards the area it occupies and the quantity which it may afford. It is doubtful if the native petroleum will be an element of commerce in this country in a century from the present time. The amount of rock gas which may be made serviceable is yet smaller. Owing to its volatile nature, it rapidly passes from the strata in which it is stored whenever they are opened by borings or by natural fractures. It seems certain that the fields which are now drawn upon will cease to give any considerable amount of the gas twenty years hence. Although the use of natural gas, which, like that of petroleum, first came about, at least in a general way, in this country, has been of momentous importance to our industries, its immediate service is clearly to be of a temporary nature. So, too, with petroleum: though it may continue to be produced from the American rocks for some generations to come, the exhaustion of the supply will be progressive, so that even within the lifetime of adult men the annual product will doubtless be greatly diminished.

The foregoing brief description of the carbon-bearing rocks of Palæozoic age will make it clear to the reader that in this remote time, long before the development of the mammalian series whence the body of man has sprung, the terrestrial conditions were preparing the land for his use, storing within it the substances which afford him energy for his arts and the light and warmth for his fireside.

In addition to the valuable carbonaceous deposits of the Palæozoic age this division of our rocks contains by far the largest store of important ores of the metals which this continent affords. First among these we must reckon the deposits of iron which occupy several distinct levels, from and including the Laurentian beds to the middle coal measures. With slight and unimportant exceptions all the iron which has been manufactured in this country has been derived from these Palæozoic formations. The richest of these deposits, consisting largely of the crystalline magnetic oxides, is contained in rocks lying in the uppermost portion of the Laurentian strata. The most extensive beds of these excel-

lent magnetic ores which are known on this continent occur in the district about the southern and western shores of Lake Superior. From them more than half of the iron ore now smelted in this country is obtained. The ores are very rich, and exempt from deleterious substances; they are often particularly well adapted for the manufacture of Bessemer steel, and this for the reason that they usually contain less than one tenth of one per cent of phosphorus, a substance which, even when present in very small amounts, makes the metal brittle. Ores of this age occur in greater or less quantity throughout a large part of the areas where these ancient rocks are disclosed.

The iron-making conditions were continued in the strata of the Cambrian age, particularly in the upper portion of that great division of the rocks which is known as the Potsdam formation. From the Potomac southward to central Alabama these beds everywhere contain large amounts of iron ore of the varieties known as limonite or brown ore, which, though less rich in the metal than magnetite, is still in many cases excellently well suited for the manufacture of iron. Here and there, though rarely, beds of this age afford an ore containing so little phosphorus that steel can be manufactured from it by the Bessemer process. In general, however, the pig metal which is made from the Cambrian ores in the Southern States can only be converted into steel by the process known as the "basic," which is somewhat more costly in the manipulations required than the older or "acid" process which was named for Sir Henry Bessemer, to whom we owe the invention.

The total quantity of iron ore contained in the section from northern Virginia to central Alabama probably exceeds that which is known to exist in the Lake Superior magnetic deposits; the ore, however, is less rich in metal, containing in general from forty to fifty per cent of iron, and, as before remarked, it contains more deleterious materials. Nevertheless, owing to its position near to the sea and to the occurrence of good coking coals in the immediate neighborhood, the ores of this age are perhaps of greater value for future use than any other which have been found in this country. In the Upper Silurian rocks, in a set of beds known as the Clinton formation, there is a layer of iron ore sometimes divided into several beds which is remarkable for its great extension and for the singular uniformity of its character. This deposit occurs as far north as the southern shores of Lake Ontario, and thence extends in an almost continuous manner

through Pennsylvania, Virginia, Kentucky, and Tennessee to central Alabama. In New York the bed is thin, rarely exceeding about a foot in depth. In Kentucky its maximum thickness is about three feet; in eastern Tennessee the somewhat divided layer may have a thickness of six feet or more; and about Birmingham, in Alabama, the deposit is fifteen feet or more in depth. These Clinton ores are always unsuited for the manufacture of steel by the Bessemer process, for the reason that they contain a large quantity of phosphoric acid; but the iron made from them lends itself readily to the basic method of purification and affords an excellent mild steel.

Owing to the singular continuity of the iron ores which belong in the Clinton group they have long afforded an admirable basis for the iron-manufacturing industry of this country. Only of recent years have the thickest parts of the beds in the South come into use. So advantageous are they that the iron-manufacturing industry of northern Alabama, which mainly rests upon these ores, has developed with unparalleled rapidity. There are, however, some serious disadvantages connected with the manufacture of iron from the Clinton ores. Although the deposits are very rich and well suited for furnace use, where they are found near the surface of the ground, they generally change at no great depth into a ferruginous limestone which is of a worthless nature. It is doubtful if at any point they can be followed with profit to points where they are overlaid by more than one or two hundred feet of strata. Thus, although the bed has a very great longitudinal extent, and in its southern portion a considerable depth, and is, moreover, well situated with reference to coal deposits of high grade, it is not likely for any great time to play as large a part in the economic history of the country as the lower-lying iron ores.

At a yet higher level in the Palæozoic rocks, in the level, or, as the geologists call it, the "horizon" of the Oriskany formation, we find here and there, though rarely, local accumulations of iron which have replaced limestones of that age. Beds of this age have been the seat of extensive iron-mining in Virginia along the headwaters of the James River and in eastern Kentucky.

Within the section of the Palæozoic rocks which is known as the Carboniferous a number of iron-ore deposits, generally of a rather local nature and of no great extent or commercial value, are found. First among these we must reckon the beds which are formed upon the top of the very thick limestones which com-

monly occur at the base of the Carboniferous period, and in which the great caverns of Kentucky and Indiana have been excavated. This bed of iron ore has everywhere proved to be well suited to the manufacture of the metal, and to afford a product of high grade particularly well suited for making car-wheels. Owing, however, to the fact that the deposit is commonly thin and usually somewhat discontinuous, the ores from it are no longer much used in our furnaces. Within the true coal measures we here and there find numerous thin beds of clay ironstone which were formerly much used by the furnaces about the head-waters of the Ohio River. The modern extension of railways, however, has given access to far richer and more easily worked beds of ore, so that these thin and lean deposits are no longer the source of any considerable production.

In addition to the coal and iron contained in the rocks of Palæozoic age we must reckon two other important substances, which, so far as this continent is concerned, are mainly stored in these ancient strata. Copper occurs in the form of ores or in its metallic state mainly in the Palæozoic beds; the same is true of the lead and silver ores which are mined in this country. So, too, the deposits of salt which afford the main supply of our people are found in the same great group of ancient rocks. The more important of these salt deposits lie in central and western New York and about the shores of the Great Lakes. They were laid down in the Upper Silurian age, when this part of the continent was at the northern margin of what is now the diminished Gulf of Mexico, and when the climate had the peculiar dryness which permits the complete evaporation of the sea-water in the lagoons near the coast or the similar drying away of dead seas.

The foregoing account of the mineral resources contained in the Palæozoic rocks has necessarily interrupted the progress of our general account of the development which this continent has undergone. We have already noted the fact that during the long ages of the earth's history from the Laurentian era to the close of the Carboniferous the continent's slow uprising from the depths of the sea at first led to the formation of an archipelago containing many islands. These scattered isles gradually enlarged, until at the beginning of the coal measures the eastern half of the country became a tolerably consolidated land. During the Carboniferous period the broad areas of plain which had recently emerged from the sea were subject to numerous oscillations, which now lifted them to a sufficient height above the plane of

The Golden Gate, San Francisco, looking north.

the sea to permit the development of extensive morasses, and again lowered their surfaces beneath the waters, so that they were covered by thick layers of clay, sand, and occasionally of limestone.

At the close of the Carboniferous period North America underwent considerable changes in its climate and geographic conditions, alterations which were shared by the European section of the Old World. A considerable part of the country, at least in the southern Atlantic district, which had previously been occupied by the coal measures, was again for a time depressed below the level of the sea. Other areas which apparently had not been occupied by the coal-bearing beds were also lowered beneath the ocean waters. How extensive these modifications of the geography were has not yet been determined, but there are reasons to believe that they were extensive, and induced great alterations in the character of the earth's climate in all the region about the North Atlantic.

The first beds to be laid down on the top of the Carboniferous section were those known as the Triassic, which in this country as well as in Europe commonly appear in the main as coarse, somewhat ferruginous, sandstones and conglomerates. In the Old World these beds hold numerous deposits of rock salt, and of other substances which are laid down when sea or river waters are completely evaporated. This process can only take place in a very dry air; in fact, it requires an exceedingly arid climate to bring about the deposition of these substances. Inasmuch as thick beds of rock salt occur in northern Germany and in the central parts of Great Britain in rocks of Triassic age, it is a fair presumption that the climate of the region about the north Atlantic underwent a singular revolution in the time between the deposition of the coal measures and that in which the next succeeding formation was laid down.

Although a portion of the Triassic age appears to have been a period of exceeding dryness, the lower part of its deposits in North America at least retain some of the characteristics of the coal measures; thus, in North Carolina and Virginia, particularly in the region immediately to the south of the James, the beds of this age contain several layers of good coal, some of which have been extensively worked. These must have been deposited in the form of bogs at a time when the air was less dry than at present; it is likely, indeed, that the country was then subjected to extreme humidity throughout all the seasons of the year. In

part before and in part after the Trias was deposited this continent, both on the east and west, experienced the effects of the mountain-building forces to a degree which had been unexampled in the ages from the Cambrian to the close of the coal measures time. The most noteworthy, or at least the best-ascertained, effect of these dislocating forces consisted in the formation of the Alleghany ranges extending from the valley of the Hudson to central Alabama. Hitherto throughout the Palæozoic ages the Appalachian system of mountains appears to have consisted of its central axis, known as the Blue Ridge, and certain chains having the same general direction and antiquity which lie in New England and in the maritime provinces of Canada. In the division of the earth's history which is at present under consideration, including the time just before and after the Triassic age, great flanking ranges of mountains and table-lands arose both to the east and to the west of the ancient Appalachian barrier. Those on the west, including the Catskills, the Alleghanies, the Cumberland Mountains, and their unnamed extensions in Alabama and Georgia, have been to a greater or less degree preserved in something like their original form through the action of the mountains of the Blue Ridge system which lies between them and the sea. Throughout the many ups and downs of the continent which have now and then brought the bases of this western chain to the sea level, the older mountains on the east have taken the blows of the Atlantic surges and so protected the ridges which lie to the west.

In the geologic ages which succeed the Trias, known in their ascending order as the Jurassic, Cretaceous, and Tertiary, the area of the continent was slowly and steadfastly extended until it assumed very nearly its present form. All the eastern islands of the old archipelago were consolidated into a great land mass shortly after the Triassic beds were formed, but the isles of the Cordilleran district remained only in part united. The Gulf of Mexico, as we may term the remnant of the old continental sea, still extended to the northward, occupying the most of the country to the west of the Mississippi up to the base of the Rocky Mountains and extending as far north as near the arctic circle. It was probably closed, however, at its northern extremity. This condition of the continental geography continued until the close of the Cretaceous time, when, by further uplifts of the land, the sea was pushed southwardly, so that it covered only that part of the existing land which is occupied by the low country within

one or two hundred miles of the Gulf of Mexico and the region bordering the Mississippi River about as far north as the present junction of the Ohio. In the region now occupied by the western plains, that great incline leading from the foot of the Rocky Mountains to the center of the continental trough, the ocean was replaced by numerous very extensive fresh-water lakes which extended from Texas to near the arctic circle. The development of these lakes was probably due to the fact that the upward growth of the continent was not at the same rate over all this uprisen area, and so great basins were formed which were abundantly supplied with water by the heavy rainfall which prevailed in this district at that time. These lakes of the continental valley which existed from the later portion of the Cretaceous time to the middle Tertiary age were probably more extensive than any existing bodies of fresh water in the world.

During the Tertiary time the eastern half of North America, though it did not change much in general form, gained considerably in area, and this through the elevation of its southern portion, which brought into the condition of land a wide field of hitherto shallow sea along the southern Atlantic shore. The plain-land district from the mouth of the Hudson to the Rio Grande was extended seaward for the width of about a hundred miles; and the northern part of Florida, that singular broad elevation or fold which extends to the southeast of the Atlantic coast, was elevated above the ocean level. The uprising in the western part of the continent was much greater in amount, and it brought that portion of the land into substantially its present form. From the fact that the valleys of some of our great rivers and bays which lie upon the eastern and western shores of the continent are continued out to seaward for a considerable distance from the present shore, it appears likely that during the Tertiary period the continent from the Gulf of Mexico northward to near the pole was some hundreds of feet higher than it is at present. From this elevated position the shores have sunk down, and perhaps the whole surface of the continent has been lowered to the attitude in which we now find it.

Before attempting to trace in outline the history of the last Glacial period, that time of ice from which the continent is now emerging, it will be well to consider certain general features which may be noted in the history of the continent from the close of the Carboniferous period to the end of the Tertiary time. First we will note the general trend that is observable in the ad-

vance of organic life in this land. The points to which we can attend are few in number, but they may serve to show, at least in outline, the progress of organic Nature in this part of the world. Considering first the development of the animal kingdom, we should observe that the forests of the coal measures were principally made up of ferns and other plants of a low organization. In the Cretaceous epoch, in the beds known by the name of the Laramie, from the fact that they were first observed in the region about Fort Laramie, near the foot of the Rocky Mountains, and which were deposited in one of the great fresh-water lakes of that area, we find the leaves and fruit of a great number of species of our ordinary deciduous trees. It is evident that at this time our American forests, at least in the portion of the continent west of the Mississippi, had taken on substantially the aspect which they now exhibit. It appears certain that this relatively modern character of our woods was acquired at a much earlier period in this country than in Europe. It seems most likely that a great part of the broad-leaved forms which now characterize the forests of Europe and Asia as well as of North America were developed on our own continent and migrated thence to the Old World over the bridges of land which at various times united the continents which are grouped about the north pole.

The forests of the Cretaceous period, in the region west of the Mississippi, contained species related to our oaks, poplars, beeches, birches, willows, and the most of our other familiar forest trees. The most important group of plants, however, which take on the arboreal form—a group belonging to the family which includes the roses, peaches, plums, apples, and many other plants which afford the most beautiful flowers and the most valuable of our fruits—were introduced in a later time; they appear to have come into existence during the Tertiary ages. The diversification of our forests, particularly as regards the plants which afford beautiful flowers and savory fruits, has gone forward with exceeding rapidity in the time which has elapsed since the Cretaceous period.

The advance in animal life, especially in that of the land, which has been accomplished since the close of the coal measures, has been vastly greater than all which was attained during the far longer time of the Palæozoic ages. So far as our knowledge goes, the land animals in existence in the Permian or closing period of the Carboniferous age were limited to a few land snails, certain kinds of insects belonging to the lowlier orders of that group,

some amphibious creatures related to our water-dogs and salamanders, and a few species of reptiles akin to our lizards. There were no birds or suck-giving creatures in existence in this part of the world, though it is not impossible that in other yet unexplored areas of the ancient land, perhaps in portions of the continents which have since sunk beneath the seas, some forerunners of these higher groups may have been living. In the beds of Triassic age in this country and in Europe, the teeth and jaws of a small suck-giving animal have been found; these are the first known members of the great mammalian series, a group which has given to the world all the higher quadrupeds, and from which came the body of man. This Triassic mammal was of small size, probably not exceeding in bulk a domestic cat; it belonged to the group of pouched mammals which contain the opossum and the kangaroo, and to a division of that class having the habit of insect-eating. Its teeth were modified for the purpose of crushing beetles, and in its general character and appearance it closely resembled one of the small Australian pouch-bearers known as the Microlistes.

Above the Triassic age we know little of the mammalia of North America until we attain to the lower horizons of the Tertiary. At that stage of the earth's history we have, in the deposits accumulated in the Great Lakes which existed just east of the Rocky Mountains, a great number of strange and interesting forms which mark various steps in the elaboration of the kinships which have given us some of our domesticated animals and many of the larger tenants of our forests. On account of the abundance of these fossils which have been readily gathered from the strata accumulated in these vanished lakes, naturalists have been able to trace with great clearness the stages by which several of our living animals have ascended from the primitive stem of the higher mammalia. Among the most peculiar of our modern animals is the horse, which differs from most other members of the suck-giving kindred in that the limbs have each but a single toe. It is not easy to believe that the massive hoof has been evolved by gradual stages of alteration from an ordinary five-fingered form, but from the fossil-bearing beds about the upper Missouri River remains belonging to several successive stages of the Tertiary beds show almost all the grades of this marvelous transformation. First, we have forms with four toes of about equal size; then another, in which one of them has shrunken away so that there were but three on each foot; finally, two more of the digits diminished in size and disappeared from the surface of the limb, though

their trifling remnants are preserved in the useless splint bones of the living horse.

Another singular group of large mammals which was developed in this part of North America in the Tertiary time was remarkable for the large number and singular structure of the horns and antlerlike projections borne upon the head of the animal. It is evident that these curious structures were intended for combat, probably between the males of the species, for there appear to have been no carnivorous species of sufficient size to attack these large and well-armed creatures.

It is an interesting fact that few of the remarkable animals which were developed in North America during the period of the Missourian lakes continued to exist in the country down to the present geological day. The greater portion of the peculiar forms became utterly extinct; and even the horse, which seems to have attained the completion on this continent, spreading thence to the lands of the Old World, died out of North America, and on the settlement of the country by the whites had to be imported from Europe. The loss of the equine life of this continent and its preservation in the Old World have been of momentous consequence in the history of man. It deprived the primitive Americans of an animal which experience has shown to be most helpful to a people on their way from savagery to civilization, and it gave to the people of the Old World a peculiar advantage in their arts.

From middle Tertiary time to the Glacial period, and perhaps through a large part of the time when the ice sheet covered the northern portions of North America, elephants abounded on this continent. These creatures do not seem to have been originally developed in this part of the world. They came to it from the Asiatic group of continents—probably by way of some land bridge between northern America and the Asiatic coast. The remains of the two species of this group, the mammoth and the mastodon, are often found in the swamps of this country under conditions which seem to indicate that they were extremely abundant in the geological yesterday. Thus, about Big Bone Lick in Kentucky the tusks and large bones of these creatures strewed the ground about the springs when they were first visited by the whites, and, a little way below the surface, diggings revealed the remains thickly crowded together in the swamp mud. It appears, indeed, likely that the last representatives of these giants vanished from North America not more than four or five

thousand years ago. The disappearance of the elephants from North America, like the similar incident in the history of the horse, can not as yet be accounted for.

In the later stages of the Tertiary time the Cordilleran region was the seat of great volcanic activity. Lava was poured forth in vast quantities, and these streams of molten rock flowed down the valleys of many rivers and solidified in the channels, filled them to the very top. When these lava streams cooled, the rivers had to force a new passage, cutting fresh channels on either side of the compact, igneous rock. Operating in this manner it has come about that the old river bed has been left upon a ridge between the paths of two streams. Soon after the discovery of gold in California the miners learned that this metal could be won from the sand and gravel which was contained in these buried channels, and within thirty years a good deal of mining has been carried on in this high-lying waste brought down by the ancient streams. In one of these buried channels lying in the vale of the Stanislaus River numerous remains of man have been found. These objects consist principally of tools, such as stone axes and implements for grinding corn. One human skull has been discovered which appears to have belonged to a man of average brain development. It will be evident even to those of no geological training that these conditions indicate that man must have been in this part of the world many thousands of years ago. We must conceive a folk dwelling beside the ancient river for sufficient time to permit the remains of their simple arts to accumulate in the stream until there were tolerably plenty in the sands and gravels of its bed. Then came the outbreak of the volcanoes, which filled the valleys to a great depth with the lava flows; then a long interval in which this thick and heated material became somewhat cooled, so that the rivers could course over it; last of all, the thousands of years which must have been required to cut down the deep channels of the rivers and to bear away the excavated rocky matter to the lower country or to the sea.

The last great geologic event in the history of North America is indicated in the evidences of ice action which are displayed in the northern part of the continent. From the Atlantic coast through Pennsylvania, along the line of the Ohio and the Missouri, and thence northward to the arctic realm, we almost everywhere find proof that a thick ice sheet lay upon the surface of the land and slowly moved in a general southerly direction. In the eastern portions of the field there is sufficient evidence to warrant

the conclusion that this glacial envelope had a prevailing depth of more than a mile. Along the Atlantic coast, from New York to the northward, the front of this vast glacier, at least during the time of its greatest extension, overpassed the present sea margin, forming an ice cliff which probably extended to the northward to near the pole. On the Pacific coast the glacial envelope was less continuous, but in the elevated parts of the Cordilleras there were many detached ice fields as far south as central Colorado, and perhaps to the region about San Francisco. As yet geologists have not succeeded in ascertaining the causes which led either to the formation or the disappearance of the glacial envelope which so recently occupied the northern parts of North America and of Europe. Nevertheless, they have secured a great deal of evidence which gives important information as to the conditions of the ice time, and they have thus made ready for the formation of sound opinions as to the cause of this singular phenomenon. We will now briefly set before the reader an account of the facts, so far as they have been observed.

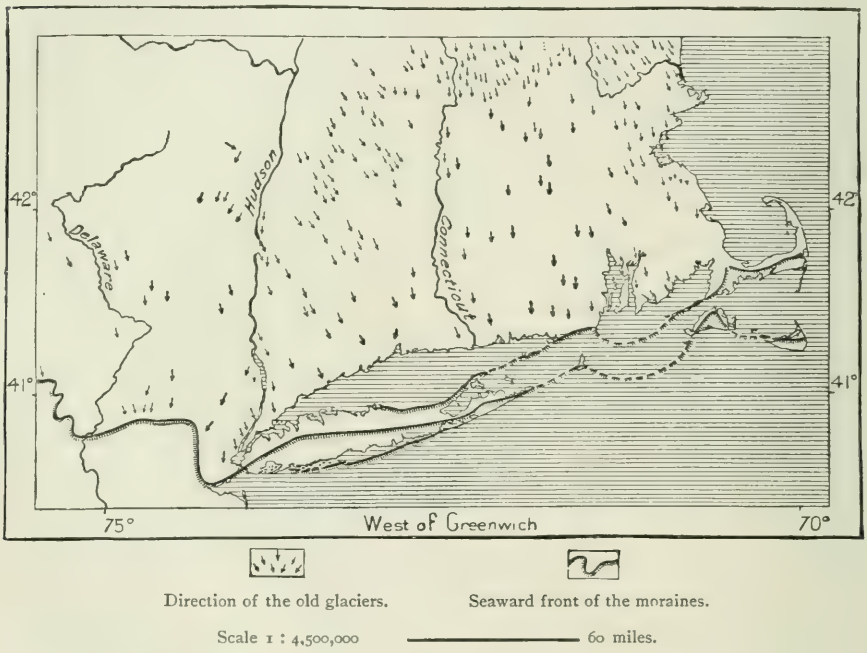
When, under the guidance of Louis Agassiz, who was the first to recognize the meaning of the indications which the ancient glaciers have left in Europe and America, geologists began to study the history of the Ice epoch, they were naturally led to the conclusion that the conditions which brought about this extensive glaciation were due to some world-wide change of climate. A careful study of the phenomena has served to show us, in the first place, that such great extensions of the ice sheet have apparently been of tolerably frequent occurrence in former ages from the Cambrian time to the present day, and that this last Ice epoch was, at least so far as the Northern hemisphere was concerned, mainly limited to the region about the north Atlantic. Although the Pacific glaciers which are now found in the region about Alaska were probably somewhat larger during the last Glacial period than they now are, and though the mountains of the coast region appear to have borne ice a good deal farther south than they now do, the Alaskan peninsula remained uncovered by the glacial fields. From other evidence we come to the conclusion that the invasion of ice in North America came about in a sudden manner, and that the ice field which pushed southwardly to the Ohio invaded a country where the temperature was not very cold. It is also clear that the southern margin of the ice sheet never preserved its place for any considerable time, but was subjected to oscillations of advance and retreat which carried the margin of

the glacier over a field having a north and south extent of a hundred miles or more.

While an ice sheet is imposed upon a country it commonly flows over the surface in a slow manner, moving at the rate of from three to twenty feet per day, and, as may be imagined, it exercises a very destructive effect on the earth over which it flows. As long as the ice is pure at the point where it comes in contact with the rocks, it merely pushes violently upon and against them; operating in this manner it soon detaches many hard fragments from the soil or the more shattered portions of the bed rocks; these bits become frozen in the ice in their upper parts, while their projecting margins are in contact with the floor over which the glacial sheet moves. Held in this manner, each hard bit as its matrix moves onward cuts a groove in the rock such as we may see on the surface of the stones in almost all glaciated countries. The process may indeed be observed now going on at the bottom of the living ice streams in Switzerland and elsewhere. Here and there beneath the glaciers their molten waters gathered on the bed rock moved toward the front of the ice, forming considerable streams which flowed with great violence, being urged onward by the pressure of the mass which was above them. These streams carried forward a great body of sand and gravel, which in its violent movement serves still further to wear away the rocks. The result of these actions was, that the superficial rocks of a country occupied by a moving glacial sheet wear away far more rapidly than when they are exposed to ordinary decay—that which is brought about by chemical action, frost, and the movement of ordinary fluid water in the brooks and rivers. The rate of wear of a district while exposed to a moving glacier is probably at least tenfold as great as when the surface of the country is in its ordinary condition.

Although the ice cut with great energy while it lay on the surface of the rocks, the time during which it occupied the southern portion of the field which it possessed during its greatest extension must have been brief, for the total depth of the rock which was worn away, at least in New England and in southern Canada, does not appear to have exceeded one hundred feet. This is shown by the fact that the channels and valleys which the rivers of preglacial time carved in the bed rocks have not been much effaced. Even those of trifling size often remain sufficiently distinct to have been reoccupied by the streams after the glaciers passed away. In the main the effect of glaciation on North Amer-

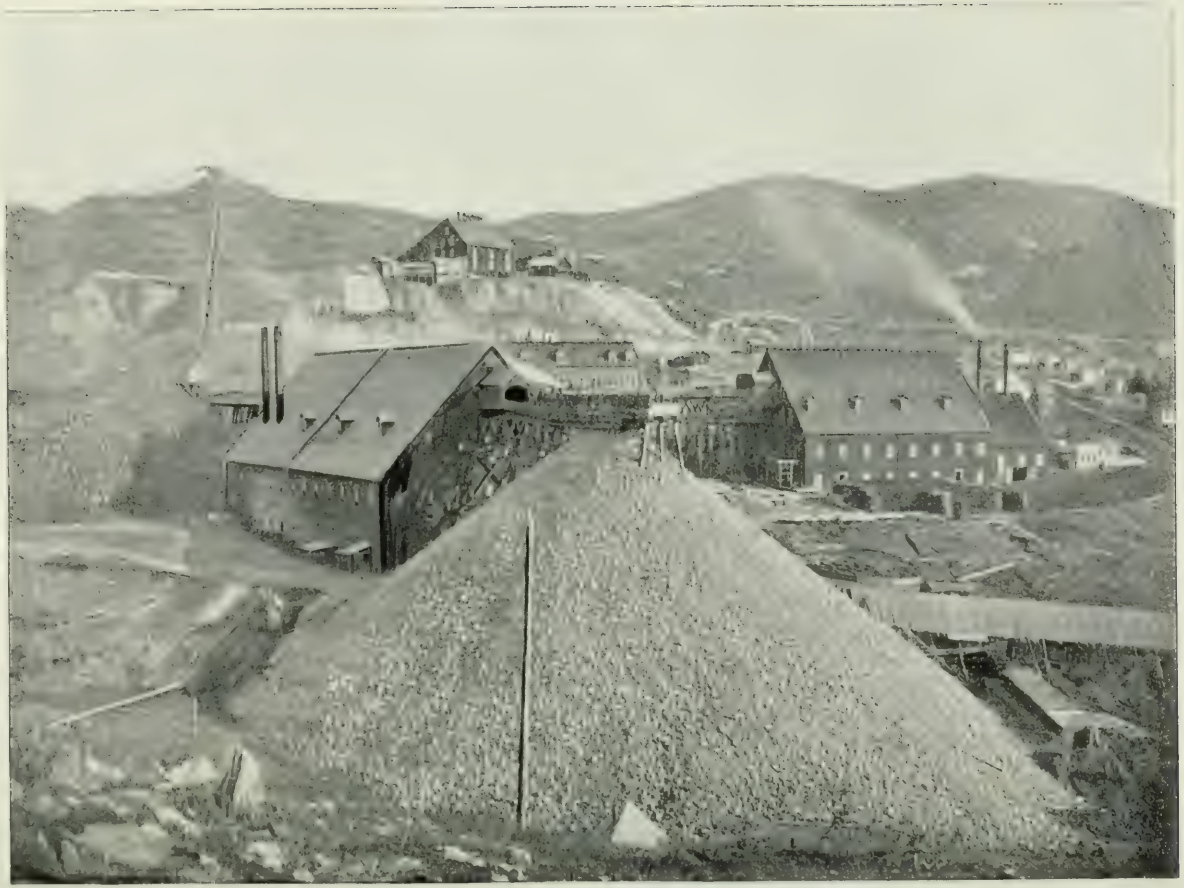
ica appears to have been to disrupt the superficial rocks which had been more or less weakened by decay, and to urge this material, together with the soil which existed upon the surface, southward toward the margin of the ice sheet, and there to accumulate it in the form of a thick covering which now mantles those parts of the country. At the same time it carved the softer rocks into curious forms, sometimes forming pits of considerable depth which are now often occupied by lakes. The irregularly distributed *débris* which was left upon the surface blocked the channels



Approximate south front of the Old New England glaciers.

of many smaller streams, and in this manner gave rise to the greater part of the myriad lakes which occupy the glaciated district of the continent.

We have already noticed the fact that the effect of glaciation on the soils of North America has been very important. In general, the influence of its action has been advantageous. It has covered the surface with a thick layer of more or less finely divided rock material, which in the progress of its decay affords an abundance of the mineral substances such as are required for the growth of plants. In most cases the deposit which the glacier



Homestake gold mine, Lead City, South Dakota.

left upon the surface of the earth is of considerable thickness, so that the plant roots are not limited, as is the case with many soils, by a hard-pan through which they can not penetrate. Here and there, however, where the bed rocks were readily broken into large fragments by the thrust of the glacier, the fields are, as in New England, strewn with great bowlders, so that it requires much labor to fit the soil for tillage. In other cases, where the surface has been covered by the sand and gravel deposited by the subglacial streams, the soil is so permeable to water, or so altogether made up of siliceous sand, that it is unfit for cultivation. Notwithstanding these local disadvantages the fields of the glaciated district of this country and Europe have a high measure of fertility, and depreciate less when subjected to agriculture than any other lands in the world except those in the delta regions of the greater rivers.

The erosive effects of glacial action is seen on the shores of the northern Atlantic and that portion of the Pacific coast of North America which was occupied by the ice of the last geologic period. This part of the seashore is fretted with innumerable bays, due mainly to ice erosion, affording an admirable training ground for seamen, as well as many of the best harbors of the world.

In the eastern half of North America the valuable mineral contents of the rocks which were formed after the time of the coal measures appear to be limited to materials which may serve for fertilizing the soil, such as marls, which are valued for the potash or soda they contain, or the deposits of lime phosphate, such as those of South Carolina and Florida. Here and there the Triassic rocks contain small amounts of copper ores, but none of these have proved of any economic value.

In the western half of the continent, particularly near the Pacific coast, the rocks which were formed after the time of the coal measures contain some locally important mineral stores. The greater portion, if not the whole, of the coal which is found along the shore from San Francisco to Alaska appears to have been accumulated after the coal beds of the eastern section of the continent, except those of Triassic age, had all been formed. As is the case in other parts of the world, these later coals are inferior in quality and occupy less extensive basins than those which were formed in the Carboniferous age. They are, however, valuable in the region about the north Pacific because of the lack of more valuable fossil fuel, and they are interesting to the geologist for

the reason that they indicate the continuance of the coal-making conditions in that part of the world long after they had ceased effectively to operate on the eastern half of the continent.

A portion of the gold-bearing rocks of California were formed during the Jurassic time. The deposits of cinnabar, the most important ore from which quicksilver is extracted, and which has afforded the basis of a considerable industry in California, occur in Cretaceous beds near the coast line. Thus, a part of the mineral wealth of the Pacific coast is found in rocks of relatively new age in deposits which were either not formed in the Atlantic section of the continent, or which, if existing there, are scantily provided with mineral stores.

So far the most valuable metallic resources which have been found on the Pacific coast consist in the deposits of gold which occur along that coast from the southern extremity of California to the central portion of the Alaskan coast. The original seat of this metal appears to have been in the more ancient rocks of the country. By the process of wearing to which these old deposits were subjected, the gold has been diffused through the later strata and has there been concentrated into lodes during the time when the beds were subjected to the mountain-building action which has so extensively affected that part of the world. Owing to the fact that gold is very heavy and essentially insoluble in the superficial waters of the earth, it does not go away to the sea through the rivers in the manner of most other substances, but remains near the point where it was lodged in the deposits from which it has been removed by the agents which wear them away. Thus it comes about that nearly all the strata of California which have been produced from the ancient gold-bearing rocks contain notable amounts of this precious metal. To these conditions is also due the fact that the surface gravels, and even the sands of the seashore in this part of the world, frequently contain gold in the form of grains or nuggets. From these detrital materials more than one half of the gold which California has produced has been won. Nearly all the gravel of the streams which traverse the country underlaid by rocks containing auriferous veins originally contained considerable amounts of the metal in the sands and gravels of their beds.

In the foregoing very brief account of the geologic history of North America it has been impossible to trace, save in the most general way, the marvelous history of the events which led step by step to the formation of this great land, to the development of

its organic life, and to the accumulation of the mineral stores which were in time to afford the material basis of human society. In proportion as the student of geology advances in his knowledge concerning the steps by which this or other continents were formed, he becomes ever the more convinced of the continuity and purposefulness of the changes which have led the land up from the sea and the life which it bears onward from its origin in the elements to its present lofty estate. From time to time he notes that portions of the continental area settle down beneath the sea; sometimes these subsidences are so extensive that they appear to threaten the integrity of the land and its fitness to maintain the air-breathing life; but when one portion of the continent sinks below the ocean level another portion uprises, so that the area of dry land appears in general to be preserved. Now and then the ice sheets cover large portions of the land and dispossess the organic life from wide realms, but these accidents are but temporary, and in the end they appear to favor rather than to harm the interests of development. With every advance in his understanding there comes to the student a keener sense of the plan which underlies the growth of the continent.

We shall now consider certain details in the distribution of the earth resources of North America and certain accidents of its economy—such as earthquakes, volcanoes, and storms—which affect the interests of man.

Sources of Dynamic Energy.

In the preceding chapters of this work we have already considered, at least in a general way, the distribution of the mineral resources in the score or more of the districts into which the continent is naturally divided. In order, however, to bring before the reader a clearer view as to the value of the under-earth resources of the country and their relation to human society at the present and for the immediate future, it will be well to present the facts in an assembled way. First among these resources of our country may be ranked those which afford the sources of dynamic energy which are the foundations of all our most important civilized arts. The energy which men secure from agents other than their own muscles or those of their domesticated animals are won from either of four sources: from the movements of the wind, from the oscillations of the tide, from the downward flow of the streams, or from the heat which may be developed by burning carbonaceous matter. Of these classes of power-giving agencies

we may rapidly pass over that of the tide, for the reason that little of value has ever been won from this source, though it is likely that in the time to come it will prove of use to the people who live along the shores where the tidal movement has a considerable vertical range. The recent inventions in the conversion of energy from its ordinary forms into the electrical state, especially the contrivance known as the storage-battery, give promise of a future for the use of tidal power. From the Chesapeake northward on the Atlantic coast, and along much of the Pacific shore, the conditions are admirably suited to the work of winning power from these movements of the sea.

The energy which can be secured from the movements of the winds is just beginning to be appreciated in this country. The only country in the world which has ever made extended use of this source of power is Holland, where, by means of windmills, a large portion of the arable land of that region is drained. Owing to the fact that North America is prevailingly the seat of tolerably constant winds, it is easy, through the modern improvements in airmills, to secure moderate amounts of energy for various domestic purposes. Especially in the region of the Western plains, where all forms of fuel are scanty, our people have resorted to windmills for the power which is needed in pumping water and in grinding corn. If the storage-batteries in which electric energy may be accumulated prove of economic value, as seems likely to be the case, the air currents will probably become a very important source of power in our domestic and manufacturing arts.

While the energy of the tides and of the winds as yet afford but trifling sources of power, that which is derived from the streams is of vast and ever-increasing value to the people of this country. North America is already first among the continents as regards the amount of water power which is utilized in industries. It is probable that, measured in horse powers or by manufactured products, the energy derived from the streams of this country are already more valuable to man than those of all other lands put together. The valuable water powers of North America are in the main limited to the region east of the Mississippi and south of the St. Lawrence and the Great Lakes. Beyond that field to the west the prevailingly arid character of the country, except in Oregon and Washington, causes the streams in general to be useless for this purpose. North of the St. Lawrence the cold winters greatly diminish the flow of the waters, and the most of the country lies beyond the habitable field of the continent. The Colum-

bia, the Willamette, and other rivers which enter the sea in the region about Puget Sound are well suited for the use of water-power mills. This is also the case with some of the rivers in the basin of the Saskatchewan.

A number of conditions combine to make the Appalachian district of North America the best field for water mills which is in the control of the English-speaking people. All this district is the seat of a considerable rainfall. The average precipitation is greater than that of continental Europe. The surface of the country is in general well suited to retain the rainfall for a considerable time within its area, permitting the outflow gradually to find its way into the streams, thus securing a tolerably constant flow toward the sea. In the glaciated district the deep coating of detritus which usually covers the country acts like a sponge to retain the waters: their outward flow is made the slower by the innumerable lakes, and the efficiency of the retardation may be increased, as is often done, by means of small dams which convert these basins into reservoirs in which a supply for the mills can be impounded. In the southern portion of the Appalachian district, beyond the limits of the glaciated field, the forests which lie about the head-waters of the streams also serve to restrain the exit of the rain water and to maintain a steadfast flow in the river channels. Last of all among the features which have given value to the water powers of eastern North America we must note the considerable height of the country and the consequent steep fall of the water courses. The average elevation of this district exceeds one thousand feet, and many of the streams preserve a rapid rate of descent until they come near to the shore line; the result is that many of our great manufacturing cities which lie near to tidal waters are able to use the rivers as sources of power. These waterfalls near the coast line are indeed a very conspicuous feature of the Atlantic shore from the Carolinas to the St. Lawrence. Waterville, Maine; Lowell, Lawrence, and Fall River, in Massachusetts; the rapids of the Passaic, the Potomac, and of the James River at Richmond, are among the more conspicuous instances of this group of seaboard water powers.

It is easy to understand how the height of a country determines the value of its streams as sources of dynamic energy which may be utilized through water-wheels. When a pound of water falls upon the earth at the height of a thousand feet above the sea it has, by virtue of that height, what may be termed a thousand foot-pounds of energy, of which a large part may be made avail-

able by means of water-wheels before it attains the level of the sea, provided it flows naturally or is made to do so over a succession of dams in its course down to the level of the ocean. Making allowance for friction, any stream which flows over a succession of dams with intervening stretches of smooth water can be made to yield about half of its energy to manufacturing uses. Practically a large amount of the flood water in times of heavy rain or melting snow can not be retained in the country. Wherever a steadfast stream of considerable size descends from the height of some hundred feet to some point on the shore which affords convenient harborage for ships we find the best conditions for the site of mills which the world affords. The power thus obtained is secured at far less cost than that which is won through steam engines. The existence of very many such streams in the Appalachian district, in a country rich in mineral resources, in construction woods, and amply supplied with cheap food, as well as favored by a climate suited to industrial activities, marks this realm as the best in the world for the development of the technical arts.

It is characteristic of our modern civilization that it has found its way by the use of fossil fuels to the largest store of readily accessible energy which the world affords to man. The power which may be obtained from the winds or from the streams has to be used under limiting conditions: it must be applied at the time and place where the force-giving conditions occur. The energy which is obtained by burning carbon, whether it is obtained from the forests or mines or from the wells which yield petroleum or natural gas, may by means of heat engines be developed at any point to which the fuel is transported, and to any amount which the mechanical needs may require. It may be used on a locomotive or a steamship, and by increase in the quantity of fuel consumed any amount of force may be put at the command of the engineer. Thus, although the wind and water powers have long been more or less used as sources of energy for various manufacturing purposes, though they have been made far more available in modern times largely through the skill of our American inventors, the range of their applications is relatively limited, while that obtained from coal fits almost all the needs of our arts. It is on account of its applicability to almost all conditions that the steam engine has become the great agent of civilization. Although such engines may be supplied with fuel from our forests, the supply from such sources is inadequate for any but the most

limited needs. Practically the whole of the fuel which they consume is drawn from our deposits of coal.

So complete has become the dependence of our arts upon steam power that the prosperity of peoples is determined by the access which they have to coal. Great as this dependence now is, it seems likely rapidly to increase for an indefinite period in the future. The industrial development of Europe is now to a great extent taking place in those states which have an access to good deposits of subterranean fuel, and, except so far as the manufacturing of this country is affected by means of water powers, the regional development of technical industries in the United States seems likely to depend in the same way on the distribution of our coal supplies. The coal of North America is mainly accumulated in the section of the continent which lies to the east of the Mississippi River. In this region it exists in practically unlimited quantities, and lies in positions which make it easy to mine, and readily accessible to the places where it is naturally demanded.

Production of the Coal Fields of the United States.

Distribution by Districts.	Area.	Product in 1890.
Anthracite.	*Square miles.*	*Short tons.*
Pennsylvania	470	46,468,641
Colorado and New Mexico	15	†
	985	46,468,641
Bituminous.*		
Triassic:		
Virginia	180	19,346
North Carolina	2,700	10,262
Appalachian:		
Pennsylvania	9,000	42,302,173
Ohio	10,000	11,494,506
Maryland	550	3,357,813
Virginia	2,000	764,665
West Virginia	16,000	7,394,494
Kentucky	10,000	1,206,120
Tennessee	5,100	2,169,585
Georgia	200	228,337
Alabama	8,660	4,090,409
	64,395	73,008,102
Northern:		
Michigan	6,700	74,977
Central:		
Indiana	6,450	3,305,737
Kentucky	4,000	1,495,376
Illinois	36,800	15,292,420
	47,250	20,093,533

* Including lignite, brown coal, and scattering lots of anthracite.

† Included in bituminous product.

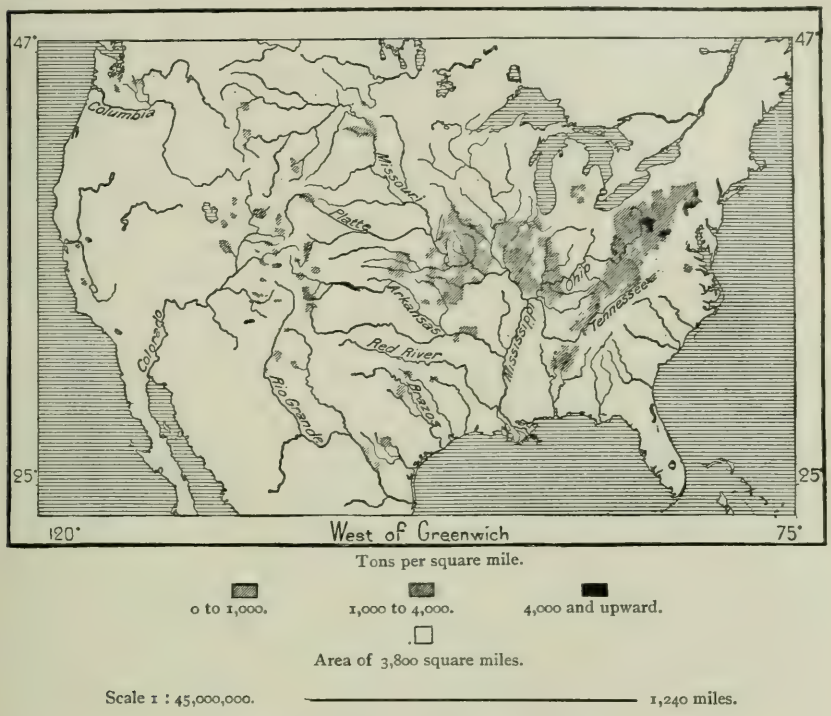
Distribution by Districts.	Area.	Product in 1890.
Western:		
Iowa	18,000	4,021,739
Missouri	26,700	2,735,221
Nebraska	3,200	2,259,922
Kansas	17,000	
Arkansas	9,100	399,888
Indian Territory	20,000	869,229
Texas	4,500	184,440
	98,700	10,470,439
Rocky Mountains, etc.:		
Dakota	.....	30,000
Montana	.....	517,477
Idaho	.....	.....
Wyoming	.....	1,870,366
Utah	.....	318,159
Colorado	.....	3,094,003
New Mexico	.....	375,777
	.....	6,205,782
Pacific coast:		
Washington	.....	1,263,689
Oregon	.....	61,514
California	.....	110,711
	.....	1,435,914
Total product sold	.....	.....
Colliery consumption	.....	.....
Total product, including colliery consumption	.....	157,788,656

By far the greater part of it is contained in the Appalachian district extending from northern Pennsylvania to central Alabama. Small, detached, and relatively unimportant fields exist in Nova Scotia and in the region about Narragansett Bay, in Rhode Island and southern Massachusetts, in eastern Virginia and North Carolina. The Appalachian coal district extends in the form of scattered patches about as far west as the great forests of that part of the continent. Coal of tolerable quality for domestic uses and for steaming occupies a large area in southern Illinois and the neighboring portions of Indiana and Kentucky, and small detached areas of yet lower grade occur in Iowa, Missouri, Arkansas, and Indian Territory.

This Appalachian coal field is the largest and richest area of such deposits which is known in the world. It is doubtful if it be equaled in extent or in the goodness of its product by the great field of China, which alone can vie with it in resources.

We thus perceive that the section east of the Mississippi is remarkably well supplied with the two important sources of energy, water powers and fossil fuel. To these resources we must, however,

add the stores of burnable rock gases and of petroleum which are contained in larger quantity and extend over a wider field than in any other part of the world. This assemblage of power-giving



Output of coal in the United States.

conditions insures to this section of the continent very singular advantages in all that part of our industries in which the command of dynamic energy is important.

In the sections from the central portions of the Mississippi westward to the Pacific the coal fields, though numerous, are of small area and their products generally of inferior quality. As a whole, the Cordilleran district must be said to be ill supplied with fuel. The forests are scanty, and the coal beds, as compared with those of the Appalachian district, of inferior value. Within the limits of Central America and Mexico no deposits of fossil fuel of economic importance have yet been discovered, and from what is known of the geological conditions of the country none are likely hereafter to be brought to light. New Mexico, Arizona, and the wide field of what is called the Great Basin, extending as far north as the Canada line, appear to contain but little valuable subter-

ranean fuel. In the range of the Rocky Mountains from southern Colorado northward into the Canadian Dominion there are some coal deposits as yet imperfectly explored, which give promise of being of great value in the development of that portion of the continent. East of this section, in the region formerly occupied by the Great Lakes about the head-waters of the Missouri, deposits of impure coal occur which have a certain limited value for local use, and on account of the timberless nature of the country are a precious resource for the domestic fireplaces. They are, however, not very well suited for steaming purposes, and are not at all adapted to the metallurgist's art.

Along the Pacific coast we again find considerable fields of coal of a second-rate quality. These deposits extend from the northern part of California to near the southern extremity of Alaska. The beds are prevailingly thin and rather irregular, so that mining the fuel is relatively very costly as compared with the expense of extracting the Appalachian coal. So far as is known, there is no high-grade coal on any part of the Pacific coast of North and South America. As soon as a canal way is made through the Isthmus district the fuel supply of this part of the world will doubtless be drawn from the southern portion of the great Appalachian field. Even at the present time a large part of the coke which is used in smelting the ores on the Pacific coast is brought from western Pennsylvania by railway transportation.

Little is known concerning the stores of petroleum or of natural gas which may be contained in the western section of North America. It seems likely, however, that both these substances are far from abundant in this part of the world. A few wells have yielded oil in California; the amount of their product, however, has been small, and the general geological conditions of the Cordilleran realm contraindicate the existence of any large deposits of these fluid and gaseous fuels.

Although the valuable mineral fuels of North America appear to be mainly limited to its eastern half, the aggregate of this most important group of valuable materials seems certainly greater than that of any other continent except possibly Asia, which may contain a total store of burnable earth products greater than that of any other continent. The larger part of this fossil fuel contained in Asia lies in China, where coal fields of great extent and richness are known to exist. If ever this obstinately conservative people come to make an appropriate use of these mineral resources in combination with their cheap and willing labor, that

Value of Natural Gas consumed in the United States in 1889, by States, and the Amount and Value of Coal and Wood displaced by the same.

States and Territories.	Value of natural gas supplied and used.	Coal displaced.		Wood displaced.	
		Tons.	Value.	Cords.	Value.
Pennsylvania	$8,287,383	6,863,062	$11,593,989	.....	.....
Indiana	1,362,472	716,461	2,002,762	44,888	$72,940
Ohio	1,120,997	1,660,456	5,123,569	24,130	92,100
New York	204,325	130,159	530,026	.....	.....
Missouri	27,825	11,859	35,687	.....	.....
Kansas	13,660	4,538	15,873	.....	.....
California	12,680	3,517	12,680	.....	.....
Illinois	8,658	7,245	10,615	.....	.....
Kentucky	2,580	615	2,580	.....	.....
West Virginia	2,000	600	2,000	.....	.....
Texas	1,728	288	1,728	.....	.....
Arkansas	375	107	375	.....	.....
Utah	150	18	150	.....	.....
South Dakota	25	5	25	.....	.....
Total	$11,044,858	9,398,930	$19,332,059	69,018	$165,040
Used at pipe lines	.....	100,000	200,000	.....	.....
Used for drilling and pumping wells	.....	400,000	800,000	.....	.....
Other uses	.....	300,000	600,000	.....	.....
Grand total	$11,044,858	10,198,930	$20,932,059	69,018	$165,040

country should win the first place in the manufacturing industries of the world.

Next in importance to the sources of this energy on this continent we may rank its stores of iron ore. These are remarkable in quantity, and are exceedingly well placed, at least on the eastern half of the continent, with reference to the sources of fuel which are required for the conversion of the ore to the metallic state. The iron ores of this continent occupy three great fields and a number of subordinate areas.

On the east the Appalachian field contains very extensive deposits of iron ore. These extend from Newfoundland southward to central Alabama and through Kentucky westward to the Tennessee River. The iron ores of this district exhibit a considerable variety. In older rocks, mainly those of Laurentian age, magnetic oxide is found; in the more southern section from New York southwardly by far the larger portion of the deposits belong to the group of brown ores or ordinary peroxides of iron. The iron ores of New England and of the Canadian provinces about the Gulf of St. Lawrence have in general the unfortunate peculiarity that they contain a considerable amount of the mineral known as titanium, which is intimately mingled with the ore and makes it extremely difficult to smelt. In the valley of the

Production of Various Kinds of Iron Ore in 1890, by States.

States.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total of all kinds of iron ore.	Percentage.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	
Michigan	6,426,077	402,274	313,305	.....	7,141,656	44.54
Alabama	1,538,297	359,518	.....	.....	1,897,815	11.83
Pennsylvania	143,745	415,779	765,318	36,780	1,361,622	8.50
New York	196,035	30,968	945,071	81,319	1,253,393	7.82
Wisconsin	784,257	164,708	.....	.....	948,965	5.92
Minnesota	861,910	.....	.....	.....	891,910	5.56
Virginia	16,212	522,908	4,463	.....	543,583	3.39
New Jersey	6,000	.....	489,808	.....	495,808	3.09
Tennessee	278,076	187,619	.....	.....	465,695	2.90
Georgia	69,271	174,817	.....	.....	244,088	1.52
Missouri	159,440	22,250	.....	.....	181,690	1.13
Ohio	.....	.....	.....	169,088	169,088	1.05
Colorado	14,698	99,577	.....	.....	114,275	0.71
Montana, Oregon, New Mexico, Utah	3,632	48,000	30,000	.....	81,632	0.51
Kentucky	.....	15,685	.....	62,000	77,685	0.48
Maryland	.....	23,343	.....	12,314	35,657	0.22
Massachusetts	.....	32,934	.....	.....	32,934	0.21
Connecticut	.....	26,058	.....	.....	26,058	0.16
West Virginia	.....	9,000	.....	16,116	25,116	0.16
North Carolina	.....	.....	22,873	.....	22,873	0.14
Texas	.....	22,000	.....	.....	22,000	0.14
Maine	.....	2,500	.....	.....	2,500	0.02
Total	10,527,650	2,559,938	2,570,838	377,617	16,036,043	100.00
Percentage of total	65.65	15.96	16.03	2.36	100.00	.....

Hudson, and in the Adirondacks as far as the Canada line, the magnetic iron ores are prevailingly of excellent quality, though from their conditions they are tolerably expensive sources of this metal. The ores of the Appalachian district south of New York probably afford the source whence the principal supply of this metal is to be drawn in the centuries to come. They have the peculiar advantage that they lie near to fuel which may be obtained at a low cost and is extremely well suited for furnace use.

The iron ores of the region about Lake Superior are, at the present time, a more important source of supply of the metal than those of the Appalachian field. The deposits are extensive and of remarkable purity, but owing to the circumstances of their occurrence their ores are in most cases costly to mine; moreover, the beds are situated in a region remote from coal which may be used for smelting iron. So long as the Bessemer process is the means by which the greater part of the steel used in this country is produced, these ores of the Lake Superior region are likely to be the principal sources of supply for the furnaces of the Ohio

Valley and the region about the Great Lakes. With the gradual increase in the use of those methods of treatment by which the phosphatic irons may be converted into steel, it is possible that these ores of the lake district will become of relatively less importance in our industries. It seems certain, however, that they will always prove among the more important deposits of this country.

The Cordilleran district, particularly the section known as the Rocky Mountains and the southward continuation of that range in Mexico, contains numerous and extensive deposits of iron ore. Unfortunately, the coals of this district are not usually well suited for manufacturing iron and the region as a whole is so far removed from the great centers of population that any iron production which may be brought about can serve only the local market. In Colorado however, where the coals are better suited for metallurgical use than those which are known to occur in any other portion of the Cordilleras, there is a prospect that the production of iron may there attain considerable importance. Some of the ores of the metal are incidentally won from the silver mines about Leadville, where large deposits of ferriferous ores of good grade are frequently encountered amid the silver-bearing deposits. It seems not improbable that from this region may come the supply of iron and steel required in the Mexican States, for, while that portion of the continent abounds in good ores of the metal, it is destitute of smelting fuel. On the Pacific coast of the United States and of Canada no very extensive deposits of iron have yet been discovered. If such should be found they would be of small value for any save local industries, for the reason that, owing to the absence of satisfactory stone coals, they would have to be smelted by means of charcoal, a method which does not permit of any very large production and can not afford cheap iron. In the island of Cuba, and probably also in Haiti, there are extensive deposits of high-grade iron ores which promise to be of much value to the industries of the continent. In the first-named island these beds are already extensively worked; the product is shipped to the United States, where it is used in the furnaces of Maryland, Pennsylvania, New Jersey, and New York. These deposits still further serve to re-enforce the resources of the Appalachian district, and to insure to that area in the immediate future a dominant position in the manufacture of this metal.

The resources in the way of iron ore which have hitherto supplied the furnaces of Europe have already been so seriously drawn

upon that they are at many points approaching exhaustion. It is evident that no enhancement in the amount of this production in the Old World can be attained without a considerable addition to the average cost of the product. At the same time it is clear that in the immediate future the great increase in the production of iron and steel is to be called for. The continents of South America and of Africa are entering on an advance in their social

	Short tons.
Production of pig iron in the United States in 1889.....	8,516,079
" " " " " 1890.....	10,307,028

	Long tons.
Production of pig iron in Great Britain in 1889.....	8,322,824
" " " " 1890.....	7,904,214

condition which will demand a very large amount of the grosser metals, particularly of iron, for the material work of their civilization. There is no other portion of the world except China where we can expect a production which will serve these new needs. In the Atlantic section of North America the annual output of metallic iron can readily be quadrupled without any considerable increase in the cost of the product, and the supply can be maintained for centuries to come. This part of the world is just entering upon its iron age, and we may expect in the immediate future an amazing increase in this most important of the metallic industries.

Next after iron, which, though commonly reckoned as the basest metal, is really the most precious of all metallic substances, we may rank copper as the most valuable of our under-earth resources. This metal was the first to be reduced from its ores and made serviceable in the arts. With the discovery of the process by which iron was won, copper descended to a very subordinate place in our industries. Until within a decade, though an extremely useful substance, it was not altogether indispensable in the arts. With the modern use of electricity this substance, because of its conducting power, has again come to have great place in the arts. It already occupies a most important position, and with the rapid extension in the use of electrical energy it is sure in the immediate future to be of the utmost value. Fortunately for the future interests of the New World, the copper-bearing deposits of both the American continents are very extensive and extraordinarily rich. So far as is known, these regions contain larger available supplies of the metal than any part of the Old

Hydraulic mining, Butte County, California.

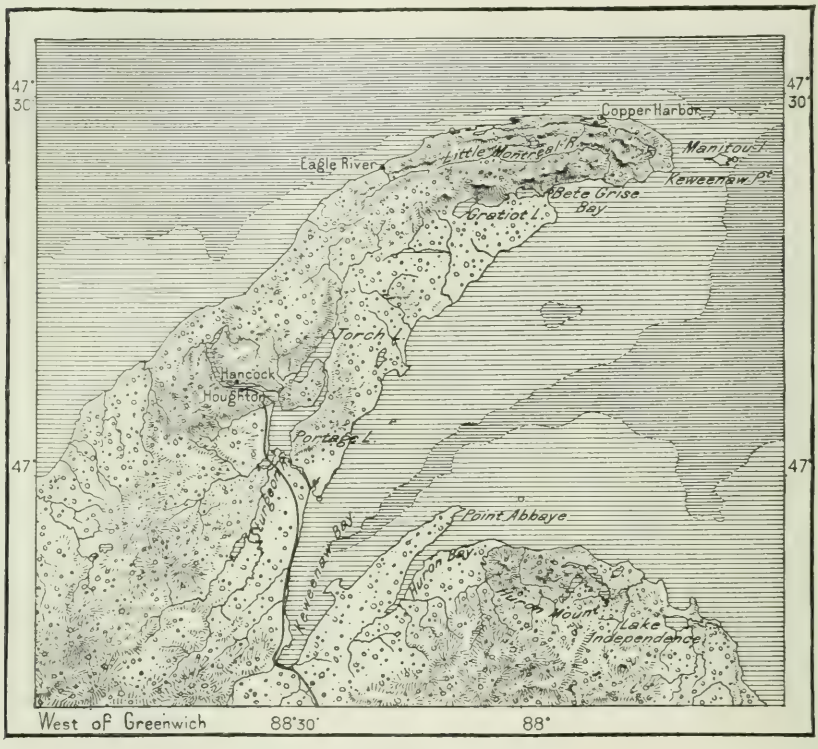
World. The copper ores of North America are mainly accumulated in the central and western sections of the continent.

Sources.	*Pounds*, 1890.
Lake Superior	100,745,277
Arizona	34,796,689
Montana	112,980,896
New Mexico	850,034
California	23,347
Utah	1,006,636
Colorado	883,132
Wyoming	.....
Nevada	.....
Idaho	87,243
Missouri	.....
Maine and New Hampshire, Vermont, Southern States, Middle States	378,840
Lead desilverizers, etc.	4,643,439
Copper smelters	2,702,559
Total domestic copper	259,098,092
From imported pyrites and ores	6,017,041
Total (including copper from imported pyrites)	265,115,133

In the Appalachian district there are a number of localities in Newfoundland, Vermont, Virginia, the Carolinas, and Tennessee where veins of copper occur, and these have at various times been considerably worked. At present, however, the production is limited to certain deposits of copper pyrites which are found in southern Newfoundland, the other mines of the Atlantic district having proved unremunerative in competition with the Western sources of production.

The largest known deposits of copper are found in the Keweenaw district of the northern peninsula of Michigan, where the material occurs in the metallic form in the interspaces between the grains of an ancient volcanic ash and in the neighboring beds of conglomerate which occupy a considerable area in this district. Already the yield of copper from this field is greater than that from any other of equal area in the world, except that from Montana, which temporarily at least has attained a more considerable production. The conditions of the sources of supply are such that the metal may be contributed to commerce by the best placed mines even in much greater quantities than at present, and, with labor at a high price, at a cost not exceeding six or eight cents a pound. This region is peculiar among all the

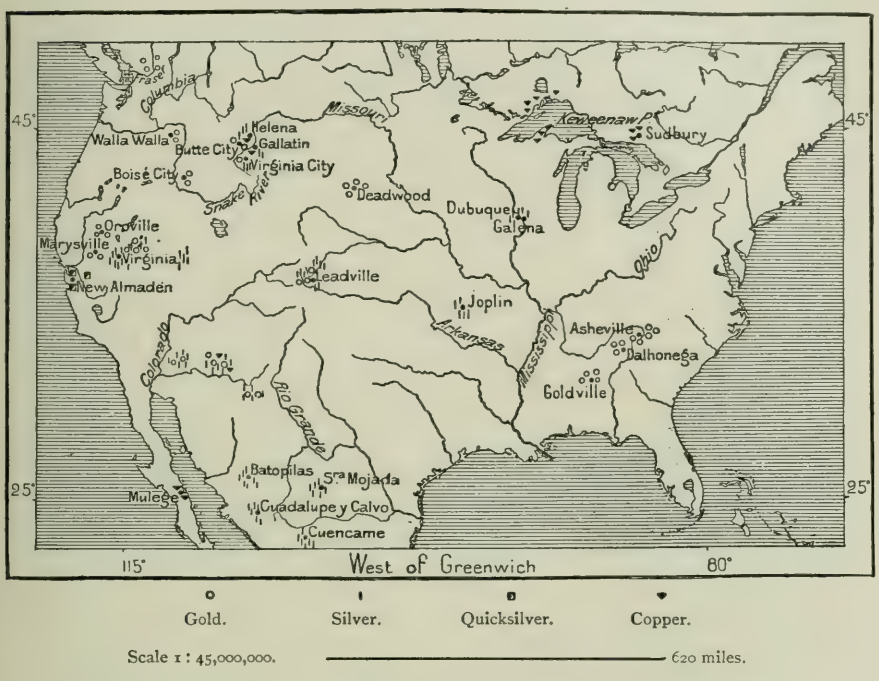
known localities where copper occurs in the fact that the substance almost altogether appears in the metallic state. Owing to its occurrence in the form of metal, the processes by which it is won to the arts in the Lake district are simpler and less expensive than those usually required in the treatment of the ore.



Keweenaw peninsula.

The copper ores of the Cordilleran field occur over a wide expanse of country between the Sierra range and the eastern margin of the Rocky Mountains. Although the ores are rich and occur in very great bodies, they generally appear in the form of carbonates or of pyrites. The fuel required for smelting is dear and of rather poor quality, except that which is brought from afar, and thus the cost of producing the metal is greater than in the Michigan field. As a whole, the copper-bearing rocks of North

America, owing to their great extent and richness, give promise of affording mining values second only to those which will be afforded by the iron ores of this country.



Some of the gold, silver, quicksilver, and copper mines in the United States.

Third in the order of the metals which this country affords we may reckon lead and zinc. In the circumstances of their distribution these substances closely resemble copper. The Appalachian field, though containing noteworthy deposits of both these metals, affords no localities which give much promise of extensive production, at least in the present condition of the market prices. In southwestern Virginia and the neighboring portion of Tennessee there is a field of considerable area where zinc ore abounds, but it is as yet doubtful whether the deposits are sufficiently rich to permit them to be worked in competition with those of the Mississippi Valley or the Cordilleran area. The central portion of the Mississippi Valley, particularly the southwestern portion of the State of Missouri, contains many fields where ores of lead and zinc abound. Of these the Missouri area appears to be by far the most important, and, from the extensive mines which have been opened there, very large amounts of these metals are marketed.

In the Cordilleras metallic lead is produced in very large quantities from the mines, which are primarily worked for the silver which the ores contain. At a number of points, the lead which is thus won as a by-product almost if not quite equals in commercial value the more precious metal which is obtained. So rich and numerous are the sources of lead and zinc in this country that the demand of the world for centuries could be supplied from this continent alone.

Production of Lead from 1887 to 1890 inclusive.

Years.	Gross production.	Lead contents of Mexican ores.	Net American product.
	Tons.	*Tons.*	*Tons.*
1887	160,700	* 15,000	145,700
1888	180,555	28,636	151,919
1889	182,967	26,570	156,397
1890	161,754	18,124	143,630

* Estimated.

Production of Zinc Ore in the leading States in 1889.

States and Counties.	Quantity.	Value.
Wisconsin:	*Short tons.*	
Iowa County	16,996	$237,463
Lafayette County	7,132	152,973
Grant County	703	10,132
Total Wisconsin	24,831	$400,568
Missouri:		
Parry County	180	2,340
Dade County	153	1,308
Greene County	677	17,139
Jasper County	72,026	1,629,538
Lawrence County	9,463	158,665
Morgan County	15	480
Newton County	8,307	191,487
St. Francois County	2,310	23,100
Total Missouri	93,131	$2,024,057
Iowa	450	3,600
Kansas	39,575	299,192
Arkansas	130	3,250
Eastern States	63,339	175,052
Southern States	12,906	141,560
New Mexico	140	2,520
Total United States	234,502	$3,049,799

The metal of next importance in our arts is tin. This substance seems to be curiously lacking in our American rocks. Notwithstanding the activity of the mining interests in North and South

America, but little of this metal has ever been contributed to commerce from the mines of either continent. Recent discoveries in the Black Hills of Dakota gave some promise that this district may afford a considerable amount of the metal, but it is yet uncertain how great will be the cost of extracting it from the ore. Whatever may be the result of these mining experiments in the Dakota district, it appears clear that in this single metal our own continent is less well provided than the lands of the Old World.

Tin Statistics in the United States for the Year 1889.

States.	Total output of tin-bearing rock.	Total capital.	Total amount paid for wages.	Other expenditures.
	Short tons.			
California	5,000	$650,000	$18,464	$12,065
South Dakota	22,000	200,000	181,783	48,752
Virginia	1,000	48,000	1,800	.....

There are sundry other metals which have a secondary value in the arts and which must be noted in this general account of the continental resources, for, though to a certain extent dispensable materials, substances used in such small quantities that they may be readily imported from other quarters of the globe, they play a sufficiently important part in the industries to make their possession of much value to a people. The peculiar metal known as quicksilver, one of the ancient acquisitions of the metallurgist's art, is valuable in the process of extracting gold from its ores and in a wide range of the philosophical and ordinary economic arts. The only valuable known deposits of cinnabar, the ordinary ore of this metal, which has been found in this country, lie near the Pacific coast. The mines have proved of tolerable richness, but, owing to

World's Supply of Tin from 1880 to 1890.

Years.	English production.	Straits shipments to Europe and America.	Australian shipments to Europe and America.	Banca sales in Holland.	Billeton sales in Java.	Total.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1880	8,918	11,735	9,177	3,756	4,735	38,321
1881	8,615	11,400	10,100	4,548	4,740	39,403
1882	9,300	11,705	10,067	4,399	4,200	39,671
1883	9,307	16,958	11,121	4,203	4,157	45,746
1884	9,574	17,548	9,337	4,193	3,600	44,252
1885	9,331	17,320	9,088	4,200	3,760	43,699
1886	9,312	19,674	8,064	4,379	4,128	45,557
1887	9,282	23,977	7,750	4,384	4,978	50,371
1888	9,241	23,855	7,975	4,430	5,220	50,721
1889	8,912	28,295	6,800	4,114	4,857	52,978
1890	9,000	27,470	6,415	5,317	5,232	53,434

the occurrence of the metal at several localities in Europe where labor is cheaper than in this country, the industry is now waning. The greatest production of quicksilver in the United States for any one year amounted, in 1877, to 79,396 flasks. The least amount recorded in Mining Record, in 1850, was 7,723 flasks.

The ores of nickel, a metal which has recently come into demand for use in hardening steel, is known to occur at a number of points in North America. These localities are widely distributed in the Appalachian, the Laurentian, and the Cordilleran districts. It is yet too early in the history of the search for the ores of nickel to determine the part of the continent in which they most abound. It seems likely, however, that the best sources of supply exist in the Columbian district of the Pacific coast.

Product of the United States, 1876 to 1890.

Years.	Metallic nickel.	Nickel in matte.	Nickel in ore.	Nickel in nickel ammonium sulphate.	Total.	Value.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
1876	.....	.....	.....	.....	201,367	$523,554
1877	.....	.....	.....	.....	188,211	301,138
1878	.....	.....	.....	.....	150,890	165,979
1879	.....	.....	.....	.....	145,120	162,534
1880	.....	.....	.....	.....	233,893	257,282
1881	.....	.....	.....	.....	265,668	292,235
1882	277,034	4,582	.....	.....	281,616	309,777
1883	6,500	52,300	.....	.....	58,800	52,920
1884	.....	64,550	.....	.....	64,550	48,412
1885	245,504	14,400	18,000	.....	277,904	179,975
1886	182,345	20,000	5,600	7,047	214,992	127,157
1887	183,125	10,846	.....	11,595	205,566	133,200
1888	190,637	.....	1,000	12,691	204,328	127,632
1889	209,763	42,900	.....	.....	252,663	151,598
1890	223,488	.....	.....	.....	223,488	134,092

In the manufacture of steel by the modern processes and in the preparation of bleaching powders, the ores of manganese have great value and are in ever-increasing demand. The useful ores of this metal occur in rather scanty but widely disseminated deposits distributed through the Cordilleran district, the region of the Ozarks in Arkansas, and in the Appalachian section of the continent. As yet no very extensive and continuous deposits of these ores have been found in this or other countries. It seems likely that in the immediate future the known deposits will be rapidly exhausted. The most promising American field for the production of this metal is that which lies in the valley of the White River of Arkansas, while the ore may be washed from the deposits of detritus in which it occurs in a nodular form.

Production of Manganese Ores in the United States.

States.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.
Virginia....	3,661	3,295	2,982	5,355	8,980	18,745	20,567	19,835	17,646	14,616	12,699
Arkansas....	.....	100	175	400	800	1,483	3,316	5,651	4,312	2,528	5,339
Georgia.....	1,800	1,200	1,000	.....	.....	2,580	6,041	9,024	5,568	5,208	749
Other States.	300	300	375	400	400	450	269	14	1,672	1,845	6,897
Total.....	5,761	4,895	4,532	6,155	10,180	23,258	30,193	34,524	29,198	24,197	25,684

Deposits of iron pyrites are now greatly valued as a source whence sulphuric acid may be obtained. Veins of this material plentifully occur in many parts of the Appalachian district along the southern margin of the Laurentian field, and in the Cordilleras of North America. In many cases copper exists in the iron pyrites in sufficient quantities to afford a valuable by-product in the manufacture of acid.

We now come to the consideration of the two metals commonly known as precious, but which are in fact of less economic value to man, at least in his technical arts, than are the most of those already mentioned. Silver and gold plentifully occur in North America, but all the more important deposits lie in the Cordilleran district. Probably ninety-nine hundredths of our store of these substances which lie in a position to be profitably mined are contained in the field between the Rocky Mountains and the Pacific, or within the limits of Mexico. In the Appalachian district gold occurs in numerous lodes from Newfoundland to central Alabama. The deposits are altogether contained in the highly altered strata of Laurentian or early Palæozoic age, the veins are narrow and untrustworthy, and, although a good deal of gold has been won from them, the product has not on the average repaid the cost of exploration and mining. The only fields where profitable mines have recently been worked lie in Nova Scotia and in the section from the Potomac to northern Alabama. Some of the mining establishments in Nova Scotia are still operated at a small profit. Those in the Southern section have, since the abolition of slavery, as a whole, proved entirely unremunerative. Although in the first part of the century, with slave labor, the mines of the Southern States yielded fair returns to their owners, it does not seem possible to make them profitable in the present social conditions of the country.

The precious-metal mines of the Cordilleran district, counting the production of gold and silver together, are now, and long have been, of more importance than those of any other con-

tinent. The Australian, and perhaps the South African gold mines at present yield a larger supply of that metal than those of this continent; but North America is now, and bids fair long to remain, the principal seat of silver production.

Production of Gold and Silver in the United States in 1889 and 1890.

States.	Gold.		Silver.			
	Eleventh census.	United States Mint.	Fine ounces.		United States coining value.	
	1889.	1890.	1889.	1890.	1889.	1890.
Alabama	$2,539	.....	77	.....	$100	.....
Alaska	904,650	$762,500	9,219	7,500	11,918	$9,697
Arizona	910,174	1,000,000	1,812,961	1,000,000	2,343,977	1,292,929
California	12,586,722	12,500,000	1,062,578	900,000	1,373,807	1,163,636
Colorado	3,883,859	4,150,000	18,375,551	18,800,000	23,757,751	24,307,070
Georgia	107,605	100,000	359	400	464	517
Idaho	1,984,159	1,850,000	3,137,508	3,700,000	4,056,482	4,783,838
Maryland	10,369	.....	.....	.....	.....	.....
Michigan	87,040	90,000	14,607	55,000	18,885	71,111
Montana	3,139,327	3,300,000	13,511,455	15,750,000	17,468,960	20,363,636
Nevada	3,506,295	2,800,000	4,696,605	4,450,000	6,072,241	5,753,535
New Mexico	815,655	850,000	1,251,124	1,300,000	1,617,578	1,680,808
North Carolina	146,795	118,500	3,000	6,000	3,879	7,757
Oregon	964,309	1,100,000	17,851	75,000	23,382	96,969
South Carolina	46,853	100,000	179	400	232	517
South Dakota	3,091,137	3,200,000	104,672	100,000	135,331	129,292
Texas	6,828	.....	323,438	300,000	418,173	387,878
Utah	487,666	680,000	7,005,193	8,000,000	9,057,014	10,343,434
Virginia	4,100	.....	10	.....	13	.....
Washington	186,150	204,000	28,464	70,000	36,801	90,505
Wyoming	14,512	.....	.....	.....	.....	.....
Other States	.....	40,000	.....	2,000	.....	2,585
Total	$32,886,744	$32,845,000	51,354,851	54,516,300	$66,396,988	$70,485,714

It is a peculiarity of the Cordilleran field of North America that the precious metals occur over a wider district and under a greater variety of conditions of deposition than those of any other land. Although this field has been for many years the seat of untiring search on the part of prospectors seeking for lodes of metal, the swift successive discoveries indicate that the mineral resources of the field are as yet most imperfectly known. The whole of the great area of this mountain belt, from the Canadian line to its northern termination near the Arctic Sea, is, except along the fringe of the coast, quite unexplored. It appears likely that this portion of the mountain system is as rich in precious metals as the more southern parts of the field, and that a thorough exploration of its area may almost double the known resources of the continent so far as the precious metals are concerned. Notwithstanding the prevailing arid conditions of the

Cordilleran area and the scant timber supply of the country, it is well suited for the development of great mining industries. The climate is admirable, rich fields for food production are not far away, and a sufficient quantity of water for the miner's needs can generally be obtained from the scanty streams or by means of aqueducts or bored wells. All the circumstances of this area go to show that, so far as the precious and the more important of the grosser metals are concerned, it is likely to be for many centuries the most important mining district in the world.

We turn now from the sources of metallic wealth of the continent to a group of substances which have come into value in the present half of the nineteenth century—namely, the materials which may be made to serve either in their natural state or after a process of manufacture for the needed refreshment of our soils when they have been worn by agriculture. In the time to come, when the triumphs of our century are recounted, there can be no doubt that this modern method of restoring the waste of tillage will have a foremost place among the achievements of our time. The search for these mineral manures has been so recently begun that we as yet know little as to the distribution of the deposits. So far, the discoveries have been essentially confined to the eastern half of the continent, to the southern borders of the Laurentian area just north of the St. Lawrence River and the western portion of Lake Ontario and the portion of the Appalachian district and the neighboring coast lands as far south as central Florida. In the Canadian field deposits of apatite, a crystalline form of lime phosphate, occur in considerable abundance in the form of veins. In Nelson County, Virginia, veins of apatite occur where the crystals of the material are intermingled with those of magnetic iron. As yet, these Virginia deposits have not been worked, but it appears likely that in time the product from them will prove of some importance. In the coastal district of North Carolina and the neighboring portion of Georgia there is a considerable area of the mainland and the shallow portions of the neighboring sea, within the bays which fret this part of the shore, where, near the surface, a deposit of phosphatic nodules occurs. Although this bed rarely exceeds two feet in depth, and the lumps of the material do not contain more than sixty per cent of lime phosphate, the ease with which the material may be obtained and with which it may be prepared for use as a fertilizer has led to its extensive exploitation. It has hitherto been a most important source of the phosphates which have been used on the

fields of this country, and large quantities of the material have been shipped to Europe.*

On the western coast of Florida, north of the Caloosahatchee River, a field of mineral phosphates, where the deposits have a great depth and a very rich return, has recently been discovered. Although the explorations of this area are still very incomplete, the region is already known to contain a much larger store of lime phosphate than any other which has been discovered in this or other countries. Notwithstanding the limited extent of the search for this important fertilizing material, enough has already been discovered to make it sure that the Atlantic district of North America will for many centuries not lack the needed supply of the most important substance required in the restoration of fertility to the soil.

The production of phosphate rock in the United States for the year 1890 was 510,499 tons, worth $3,213,795.

Besides the deposits of lime phosphate, which are by far the most important of the geological fertilizers, the eastern part of the continent of North America contains numerous beds of marl or deposits which are rich in the materials demanded by our principal tillage plants, but which are valuable only for local use. The production of marl in the United States, in 1889, amounted to 139,522 tons. The marl deposits of the Cretaceous and Tertiary beds have been considerably used in the district from Maryland to southern Virginia. Those in the other parts of the country have, owing to our careless system of agriculture, been neglected by our farmers. With the improvement in this art which is now coming about we may expect these sources of fertilizing material to be more sought for. There is reason to believe that they may be of great value in maintaining the fertility of our fields.

Among the more considerable mineral resources of this country we must reckon the extensive beds of rock salt which occur mainly in the region of western New York and along the borders of the Great Lakes and in the western portion of Louisiana. Vast accumulations of this material exist in this part of the continent, and amply provide for the needs of the central and eastern portions of the country. In the Cordilleran field a sufficient supply of salt for all local demands exists in the deposits formed about the dead seas of that region. Those near Salt Lake, of

* In 1887, 480,558 tons of phosphate were produced from the South Carolina deposits, of which about 200,000 tons were shipped to foreign ports.

Quantity and Value of Salt produced in the United States during the Year 1890.

States and Territories.	Production.	Value.
	Barrels.	
Michigan	3,837,632	$2,302,579
New York	2,532,036	1,266,018
Ohio	231,303	136,617
West Virginia	229,938	134,688
Louisiana	273,553	132,000
California	62,363	57,085
Utah	427,500	126,100
Kansas	882,666	397,199
Nevada, Illinois, Indiana, Virginia, Tennessee, Kentucky, and other States and Territories, estimated	300,000	200,000
Total	8,776,991	$4,752,286

Utah, have already been extensively exploited for the salt which is required in the reduction of certain ores that plentifully occur in that area.

Last of all among the mineral resources of North America we must reckon the rock materials which have value for construction purposes.

Production of Granite in the United States in 1889, by States and Territories.

Rank.	States.	Value of output.	Rank.	States.	Value of output.
1	Massachusetts	$2,503,503	16	South Dakota	$304,673
2	Maine	2,225,839	17	Wisconsin	266,095
3	California	1,329,018	18	New York	222,773
4	Connecticut	1,061,202	19	Delaware	211,194
5	Rhode Island	931,216	20	North Carolina	146,627
6	Georgia	752,481	21	South Carolina	47,614
7	New Hampshire	727,531	22	Oregon	44,150
8	Pennsylvania	623,252	23	Texas	22,550
9	Vermont	581,870	24	Utah	8,700
10	Missouri	500,642	25	Montana	76,000
11	Maryland	447,489	26	Arkansas	
12	New Jersey	425,673	27	Washington	
13	Minnesota	356,782	28	Nevada	
14	Virginia	332,548			
15	Colorado	314,673		Total	$14,464,095

Production of Marble in the United States in 1889, by States.

Rank.	States.	Value of output.	Rank.	States.	Value of output.
1	Vermont	$2,169,560	7	Pennsylvania	$121,850
2	Tennessee	419,467	8	Massachusetts	
3	New York	354,197	9	Idaho	
4	Georgia	196,250	10	Virginia	
5	Maryland	139,816			
6	California	87,030		Total	$3,488,170

These include not only building-stones, but the clays and cements which may be made to serve for architectural constructions or in the potter's art. The variety of these materials on the American continent is great, and they are well suited to all the ordinary demands of the arts in which they are employed. As yet no white marble has been found in this country which is of as fine a quality as that obtained in the Carrara district of northwestern Italy, nor have our other ornamental stones of the higher grade as yet rivaled the decorative materials which are produced from the quarries at various points about the Mediterranean. At several places, however, in the Appalachian district, from Vermont to Georgia, very satisfactory building and ornamental stones which are commonly classed as marble, abundantly exist. Serpentines resembling the finer qualities, which in Europe are valued for their decorative effect, also abound in the older rocks of eastern North America. The commoner varieties of building-stone, the granites, the limestones, and sandstones,* are so generally distributed over the continent that only in the lowland section of the Atlantic coast and the Gulf of Mexico is there ever any difficulty in securing one or the other of these varieties of rock in a form well suited to be used in masonry constructions and of a nature to endure weight and to withstand the conditions of our trying climate. In the Cordilleran field the variety of rocks suited to the use of the architect is very great; for in that field, besides the ordinary crystalline and sedimentary materials, such as occur in the eastern part of the continent, there are great deposits of a volcanic nature which afford at many points stones that are conveniently quarried, and afford materials of great beauty, strength, and endurance.

The ordinary limestones of this country produce, on burning, an excellent mortar, and many of the strata, particularly those of Silurian age, afford materials which can be manufactured into hydraulic cement.

Owing, however, to a curious lack of enterprise in the production of this last-named material, the American hydraulic cements are still excelled by those which are manufactured in Great Britain and Germany. This defect is probably not due to the lack of the original quality of the cement rocks, but to the

* In 1889 the output of sandstone in this country was 71,571,054 cubic feet and 5,126,340 cubic feet of the variety called bluestone. Nine States produce more than one million cubic feet each, and the four leading States—Pennsylvania, Ohio, Colorado, and New Jersey—produce together over forty-six million cubic feet.

Marble quarry, Georgia.

Product of Natural Cement in 1889, 1890, and 1891.

Localities.	1889.	1890.	1891.
	Barrels.	*Barrels.*	*Barrels.*
Rosendale, New York	2,547,225	2,683,579	2,815,010
Louisville, Kentucky	1,338,464	1,533,579	1,501,200
Buffalo and Akron, New York	682,275	698,396	745,450
Lehigh Valley, Pennsylvania	350,000	450,000	520,000
Milwaukee, Wisconsin	350,000	400,000	425,000
Utica and La Salle, Illinois	250,000	400,000	450,000
Potomac River	200,000	200,000	250,000
Fort Scott, Kansas	150,000	150,000	140,000
Mankato, Minnesota	78,912	87,650	101,875
Onondaga and Schoharie Counties, New York.	225,000	202,000	215,000
Virginia, Georgia, Texas, Ohio, Missouri, and New Mexico	270,000	277,000	288,000
Total	6,531,876	7,082,204	7,451,535

fact that this industry has received less attention from our American inventors than any other part of our important economic work. The brick and pottery clays of this country are abundant and widely distributed. Those of ordinary quality abound in almost every part of the continent, and others of the rarer sort, such as are required for the finer varieties of porcelain and for the more enduring forms of fire brick, occur at a number of localities. As yet these construction clays of the United States have remained unsought over the larger portion of the continental field; the pottery clays in particular have received but little attention. Those which are fitted for the finer as well as the ordinary varieties of earthenware abound in the Tertiary beds from southern Massachusetts southward along the Atlantic border of the Appalachian highlands, and up the Mississippi River as far as western Kentucky and eastern Missouri. The peculiar clay required in the manufacture of porcelain known as kaolin, and which is produced by the decomposition of feldspar, occurs in local deposits wherever veins of that rock have been exposed to long-continued decay. As a whole, the accumulations of this material appear to be inferior in the quality of their products to those of Europe, but here again the deficiency may be due to an inadequate knowledge of our mineral stores. At present, however, potters are seeking the supply of this material on the undecayed vein deposits of feldspar which plentifully abound in the Appalachian and the Cordilleran district.

So many of the modern arts require the use of a high temperature that fire brick, which commonly serve for the lining of all furnaces, are of great importance in the arts of a country. Clay

suited for this use abounds in the eastern portion of the continent in and about the Appalachian Mountains. The most ordinary method of occurrence of the material is in the clays which underlie the beds of ordinary bituminous coal which abound in the region to the west of the Blue Ridge. These beds are, in fact, the soils in which grew the rooted plants of the old swamps where the material of the coal was accumulated. Their fitness for use as fire brick is due to the fact that the lime, potash, and soda originally contained in the bed has all been removed by the roots of the ancient plants, and thereby the mass has been deprived of those so-called basic materials which greatly promote the melting of the silica, which in all cases constitutes nearly the whole of our fire-resisting forms such as the bricks used in furnace lining.

The group of stones which are valued in constructive work for the reason that they may be split into thin, strong layers for roofing slates or flagging is abundantly developed throughout the Appalachian district, where the highly altered rocks appear. Slates are extensively quarried in Maine, Vermont, Pennsylvania, and the northeastern part of Georgia, and they occur at a number of intermediate points in the field. Until within the last half century nearly the whole of this class of quarried stones came to this country from northern Europe. At present the domestic demand is almost altogether supplied from the deposits in the Appalachian belt.

Besides the foregoing list of the more important mineral resources of this country there are very many other materials which are won from the under earth that are of considerable use in the arts, but which from their nature are not likely to play an important part in the industries of our people. Among those which may be briefly mentioned is mica, a substance which has been considerably used for decorative effects in stoves, and now finds a certain application in the manufacture of wall paper and some antifriction compounds.

Cut Mica produced in the United States from 1880 to 1890.

Years.	Amount.	Value.	Years.	Amount.	Value.
	Pounds.			*Pounds.*	
1880	81,669	$127,825	1886	40,000	$70,000
1881	100,000	250,000	1887	70,000	142,250
1882	100,000	250,000	1888	48,000	70,000
1883	114,000	285,000	1889	49,500	50,000
1884	147,410	368,525	1890	60,000	75,000
1885	92,000	161,000			

This interesting mineral occurs in great quantities in veins of a felspathic nature which abound in the crystalline rocks of the Laurentian, Appalachian, and Cordilleran fields. The varieties of stone which are used for sharpening tools, such as scythestones, grindstones, and the finer-grained slabs required for delicate tools, exist in great plenty. The scythestones of New Hampshire have a world-wide reputation and are sold in almost every market. The *novaculites* of Arkansas afford whetstones as good as those from Turkey, and the field in which the deposits occur occupies an area of several hundred square miles. Small quantities of another group of sharpening materials, known as corundum and emery, are produced from mines in western Massachusetts and in North Carolina. A host of substances of minor importance are, for the reason of their small present and future production and their limited place in the arts, necessarily passed by in this general account of the mineral wealth of the continent.

So far as the under-earth resources of the country are concerned, the continent of North America, or even the limited portion of the area which lies within the United States, may, save for three or four mineral substances, be regarded as independent of the rest of the world. Of these the most important are the nitrates of soda and potash, which are required in the manufacture of gunpowder. If this nation should ever be effectively blockaded by a general assault from the navies of Europe, our people might be distressed for lack of this material. If such a deprivation should endure for a considerable period, so as to exhaust the government and other stores of the material contained in the country, we might be driven to other forms of explosives, or even to the device used during the Napoleonic wars, when the farmers were required to keep pigeons and husband the dung of these birds for the use of the Government. In case of such an almost impossible blockade of our coast, the country would be unable to afford a supply of tin, a metal which has become of very great value for coating iron plates, such as are used in the manufacture of our kitchen utensils. So, too, the supply of sulphur which this country can afford is not enough for its demands, and it is doubtful if any increase in its price would insure a sufficient supply from our own fields, though there are promising localities in Nevada and Utah.*

* In 1889 the total production of crude sulphur in the United States was 1,150 short tons, while the amount imported in the same time was 135,933 long tons.

Although there are a number of other substances of small account for which we rely in the main, or altogether, upon foreign sources of supply, the foregoing exceptions indicate the only materials for which this country would be likely to suffer in case its communications with foreign lands were entirely interrupted for a considerable term of years. In this way, perhaps better than in any other, the reader may perceive the abundance and the variety of the underground stores which the continent affords. In the present condition of its mining industries the United States is more independent of foreign sources of mineral values than any other state in the world. It is doubtful if any of the continents are at the present time so well provided with this group of natural resources, or have won their way to a more general use of these gifts of fortune.

Not only have our people pushed forward with amazing swiftness in their work of developing the mineral wealth of the country, but they have brought to this labor the thrift and inventiveness which characterize the greater part of our economic undertakings. Although the mining enterprises of this country have, with slight exceptions, been developed in the last half century, the list of American inventions bearing upon the extraction or reduction of metals and other earth materials is surprisingly great. They far exceed those of continental Europe, and, except in the arts which relate to smelting iron which are British inventions, they exceed those of all European countries taken together. Especially in the art of the quarryman, which in Europe still remains in a very primitive condition, our people have made a very great advance. Nearly all the valuable machinery which serves in the extraction and treatment of building-stone have been devised in this country. We are at present in the midst of very rapid progress in all that relates to the arts of the miner, and the next generation will doubtless see this branch of economic work in a far more developed state than it is at present. We have, in the foregoing pages, rapidly reviewed the conditions of the under earth which most notably influence the life of civilized men in North America; we may now turn to certain surface phenomena which affect their well-being in the regions of the United States.

Volcanoes, Earthquakes, and Storms of North America.

The fitness of any land for the uses of civilization, or even for the habitation of men in any social condition, depends in large measure upon what we may call the physical repose of the coun-

try—upon the absence of great disturbances in the earth and air. Earthquakes, volcanic outbreaks, and certain kinds of storms are destructive of that confidence in the surrounding Nature which is essential to the freest advance of civilization. Great disasters, such as may come about through earthquakes, volcanic explosions, or hurricanes, interrupt the continuity of all the labors on which the well-being of society depends; they destroy the accumulated wealth which has been won by generations of labor; and, if frequently repeated, may undermine the hopefulness which leads men to persist in the toil through which all advance is secured. It is therefore fit that, in closing our survey of the physical conditions which affect the well-being of man on this continent, we take some account of these phenomena.

The continent of North America is at present singularly exempt from the destructive effects of volcanic action. Although in past geological periods various portions of this land have been subjected to frequent and great volcanic outbreaks, all activity of this sort died out in the eastern section of the area soon after the close of the Carboniferous time. The Triassic period appears to have been the last in which the region east of the Mississippi saw any trace of volcanic outbursts. In the Cordilleran region these disturbances were continued down to and after the coming of savage man into that part of the continent. They were singularly active and widespread in the destruction which they brought about. At the present time, however, the igneous forces have ceased to disturb the surface of the earth in all the section from southern Mexico to central Alaska. The last outbreaks in the middle section of the Cordilleras appear to have occurred some centuries ago. In Central America a number of volcanoes have been in eruption since the country was settled by the Spaniards, and similar disturbances have frequently been noted in the Aleutian Islands, a volcanic archipelago which stretches from the southern coast of Alaska toward the Asiatic shore.

It is difficult to reckon the liability of this continent to earthquake shocks beyond the period during which it has been occupied by European peoples. Volcanic outbreaks for a long time produce very decipherable indications on the surface of the country, but earthquake shocks, even those of the greatest violence, leave little of a readily interpretable sort to mark their occurrence. It is possible, however, by examining an area such as North America to find here and there detailed features, such as pinnacled rocks, poised bowlders, and accumulations of *débris*

on very steep slopes, which we know would have been shaken down by a great shock, and which we likewise know to have remained in their present position for some thousand years. Making use of these indications, and of the historic records of this country which give us an account of the region around the Gulf of Mexico for about four centuries, and of the Atlantic coast for nearly three, we are enabled to make some general estimate as to the stability of the earth in this part of the world.

As a whole, the continent of North America appears to be less liable to violent oscillations of the earth than any other of the great lands, except perhaps Australia, and possibly Africa. Asia, Europe, and South America are decidedly more exposed to disturbances of this nature. Nevertheless, certain portions of this continent are in a subterranean state which makes them liable to earthquake shocks. The field which is most exposed to these visitations includes Central America, northern Mexico, the southern portion of Arizona, and the western coast of the United States as far as northern California. The portion of the country from the Isthmus as far north as southern Mexico has repeatedly been the seat of violent earthquakes. In general these disturbances affect limited areas, but they have been so severe as to ruin cities where the buildings were of a very substantial character. The energy of the shocks diminishes as we go northwardly, but they are of frequent occurrence and of considerable though hardly of disastrous violence as far north as San Francisco. The central portions of the Cordilleran district north of southern Arizona, though the seat of occasional slight tremors, do not, so far as we can judge from the historical and physical evidence, appear to be liable to violent earth movements. The region abounds in pinnacled rocks, which must have been for centuries, if not thousands of years, in a state in which they would have been overturned by any disturbances of a serious nature.

The section of the Mississippi Valley from near the mouth of the Ohio southwardly to near the northern part of Louisiana, appears to lie within a field where earthquakes of violence may be expected. The shocks which occurred in this field in November, 1811, and which continued in swift succession for two or three years thereafter, were in their beginning of exceeding violence. It is doubtful if a disturbance of equal intensity combined with such continuance has been recorded in any other land. In this part of the country there are no physical features which enable us to judge as to the frequency of similar

shocks in former geologic time; but as there were no traditions among the Indians which point to like disturbances in the past, and as nearly a century has elapsed since the cessation of these movements, it seems not improbable that the visitation was unique, and may not be repeated for a long period to come.

The region about Charleston, S. C., has recently been the seat of a considerable earthquake disturbance. Although the district affected by the violent movement and the energy of the shock were alike limited, the movement proved destructive to life and property. The damage which was done is mainly attributable to the imperfect construction of the buildings of the city The Government edifices, such as the lighthouses, which were built with due precautions as to the quality of the mortar used in the masonry, were essentially unharmed; if the edifices in the city of Charleston had been as well constructed, the damage to life or property would have been slight. The district affected by this earthquake has been historically known for over two hundred years, and in this period no shock of considerable violence has been observed within its area. It therefore seems likely that the Charleston earthquake belongs to that class of disturbances which occasionally and at long intervals have been observed in different parts of the world. Unique accidents of this nature have happened in southern Germany and in western England. In each case for centuries before and after the district has been unshaken.

The New England district and the neighboring portions of Canada show by their historic records that the region is subjected to occasional earthquakes of moderate severity. The shock of 1727 was continued for a term of eight years in many repeated oscillations, which affected a small field near the mouth of the Merrimac River. This disturbance is one of the most notable on record, for the reason that each of the successive quakings, which appear to have amounted to hundreds, was attended by loud noises from the under earth. These sounds were of a terrifying nature. The records compare them to thunder, and again to the clanking of chains. The earthquake of 1755 was probably of more violence than the recent disturbance at Charleston; owing, however, to the fact that the houses of that period were generally constructed of timber, and the few masonry edifices were low, well-built structures, there was no loss of life, and but little damage done to property. It seems clear that a shock of equal energy occurring at the present time in the same field would prove in a high measure disastrous. The section of the Atlantic

coast from southern Massachusetts to northern South Carolina appears, so far as historic records go, to enjoy an immunity from earth quakings. So, too, the Appalachian highlands from Massachusetts to Georgia appear from historic and physical evidence to be free from the danger of violent disturbances. The lowlands of the Gulf and the level country of the Mississippi Valley, except the before-noted district near the Mississippi, have likewise shown, at least during the period since they have been occupied by the whites, an exemption from all but unimportant shocks.

We have now to consider the disturbances of the air which may injuriously affect the interests of our people. Over most of the area of North America this class of accidents are more serious than those which occur in Europe, or indeed on any other of the continents. While all the great lands are liable to destructive storms, and all of them exhibit some trace of the more violent classes of atmospheric convulsions, North America is more generally subject to these accidents than any other equally extensive area in the world. The most violent American storms may be grouped as hurricanes, tornadoes, and blizzards. Of these the first named are mainly limited, at least in their more destructive effects, to the areas of the Caribbean and the Gulf of Mexico, or what we may term the Columbian seas, while the tornadoes and blizzards are mostly confined to the Mississippi Valley. Although it is not possible for us here to discuss in any detail the physical history of these atmospheric accidents, it will be necessary to note some of their principal features, and to give a general account of their distribution and the causes which bring them about.

Hurricanes are perhaps the least peculiar of our American storms. They occur not only in our own seas, but in the Indian Ocean and along the western coast of Asia. When, toward the end of the hot tropical summer, the air next the surface of the water becomes very much heated and laden with moisture, it seeks to rise through the overlying colder layer of the atmosphere. Finally, at some point the lower-lying air breaks through to the upper regions of the atmosphere and a swift ascending current is formed, in the manner of a great chimney, through the colder part of the envelope. Into this chimney the great body of heated air which lies next the surface of the earth rapidly moves, in the manner in which the air of a room is drawn to the shaft at the fireplace. In a short time the movement extends for a distance of a hundred miles or more on either side of the ascending column. It is

Treadwell gold mines, Douglass Island, Alaska.

easy to see why this movement is slow in the paths which are remote from the center of the uprush and go swifter as that point is approached. Toward the center the particles tend to become more crowded together, and have ever to move the more rapidly. A convenient illustration of the principle may be had by observing how down floating in the air of a room has its velocity accelerated as it approaches the fireplace. It is not quite so easy to conceive why the uprushing air in a hurricane, and that which moves toward the ascending column, take on a whirlwind movement. This motion, however, may be conveniently illustrated by allowing the water to escape from a wash-basin which has a hole in the bottom. We readily note the fact that the fluid in its outflow always takes on a spinning movement. Even if we again and again arrest the flow, it requires but a moment, after the water is again permitted to escape, for the whirling to be resumed.

It is characteristic of our American tornadoes that the individual storms often continue to exist for some weeks while they slowly march across the surface of the sea or along the margin of the shores. In general, they originate in the Gulf of Mexico or the western portion of the Caribbean, then move eastwardly toward the lesser Antilles, and then, when coming into the field of the trade-winds, they are apt to be recurved to the northwestward, where they sometimes attain to or even cross the Gulf Stream. In some cases they have been observed to follow the path of that current toward the shores of Europe, and in an enfeebled form they probably in rare instances attain that coast. As their motion depends upon the existence of very warm air next the surface of the sea, they naturally die out or diminish greatly in energy as they pass beyond the tropical waters. A part of the energy of their movement is believed by meteorologists to be derived from the condensation of the moisture contained in the air when it starts on its upward course and which is precipitated in the form of rain. The heat which is required to maintain the water in a vaporous state is considerable, as we may readily judge by observing how long an exposure to a hot fire is required to evaporate even a small quantity of water. When the moisture is condensed into the form of rain, the heat is returned to the air and helps to maintain the uprising column of it, which is the primary source of all the hurricane movements.

The damage done by hurricanes is in part effected by the energy of the winds, which often attain a speed of eighty or more miles an hour, blowing with something like this swiftness for several

hours at the same place. The great pressure or friction which these winds effect on the sea often lifts the waters on the margin of the storm to the height of ten feet or more above their normal level. Where the shores are low, as on portions of the coast of India, this uplift of the sea may inundate a wide field, and prove very destructive to human life and that of the lower animals. This particular effect of hurricanes has been observed in the West India Islands. Serious as these evils are in the Caribbean and Gulf sections of the continent, they are nevertheless not so menacing as are the similar accidents in the China seas, where the typhoons attain all the violence of the American hurricanes, and, occurring in a populous region, are much more destructive to life and property.

The tornadoes of North America are like the hurricanes, in that they are whirling storms brought about by the escape of warm and moist air from the surface into the upper regions of the atmosphere. They differ from the tropical storms in their size, the frequency of their occurrence, and, in fact, that they form on the surface of the land. Recent studies of the conditions under which they occur enable us to make the following statements concerning them. In the middle latitudes of North America, say from thirty-five to fifty degrees north, the ordinary great changes of the weather are brought about by the development of great whirling movements in the atmosphere which obscurely resemble hurricanes, but are much wider and of less violence, and which occur to a greater or less extent throughout the year. These great circling movements march with varying speed, but generally at the rate of from fifty to a hundred miles in each twenty-four hours, across the continent and thence over the seas in a prevailingly northeastern direction. Owing to the friction which the air encounters next the surface, the upper portion of the storm is in advance of its lower part. Hence it comes about that from the southern to the eastern side of the whirl, cold air is often brought in great volume over the warm moist air which lies next the surface on that quadrant of the cyclone. In these conditions the heated lower air often breaks through the overlying colder envelope and spins rapidly upward. The width of this whirling and the energy of its movement may vary greatly: in the simpler manifestations we may have only trifling spinning columns of air where the conditions are more favorable for the development of the movement, we may have the normal destructive tornado, in which the whirl may have a width of from a few hundred feet to

a mile or more, and the motion of the air be strong enough to produce a measure of destruction far greater than that accomplished in any hurricane.

In the more violent tornadoes, such as occur in the central portions of the Mississippi Valley, the upward rush of the air is often strong enough to lift large timbers and house-roofs, as well as the bodies of men and cattle, to the height of several hundred feet above the surface, and the horizontal sweep of the wind on the periphery of the swift-turning wheel of air can uproot the stoutest trees or displace a locomotive from the track. In passing over a small lake one of these tornadoes has been known to remove all the water from the basin, leaving the bottom perfectly dry. Although the path followed by these most destructive storms is generally less than half a mile in width, the whirl often moves in its prevailingly eastward course for the distance of from ten to thirty miles, so that the area of the destruction which it inflicts frequently amounts to a total of from five to ten square miles. Fortunately, not all, or indeed any considerable part of the cyclones which sweep over this country, develop the conditions which lead to the formation of tornadoes, but where the circumstances are favorable several of these local spinnings of air may be formed on the southeastern versant of one of these greater whirlings.

The area in which the storms of this nature occur with sufficient violence to prove seriously destructive is in general included between the eastern seacoast portion of the United States, the hundredth meridian on the west, and between the parallels of thirty-five and forty-five degrees north latitude. Although they sometimes prove damaging in the Appalachian district and along the Atlantic seaboard, they are most to be apprehended in the section northwest of the Ohio River and thence to near the Canada line, and in the States of Missouri, Kansas, and Nebraska, beyond the Mississippi. In portions of this Western field tornadoes are already to be reckoned as a scourge fit to be compared with earthquakes in those parts of the earth where their visitations are most frequent. No year passes without a considerable loss of life from these convulsions, and, as the country becomes more occupied, the measure of their destruction is likely to become much greater than it is at present. It is more difficult to provide against the damage which these storms inflict than it is to guard against the evils of ordinary earthquakes. In general those perturbations of the earth do no harm to the crops or to the forests. All the

damage which they inflict is brought about through the fall of ill-constructed buildings; but the tornadoes sweep the field over which they pass as with a gigantic broom.

The careful studies which have been made on tornadoes clearly indicate that the destruction of buildings is caused not only by the violence of the wind developed in its horizontal whirling motion, but also to a great degree by the sudden expansion of the air within the house as the center of the storm passes swiftly over the structure. It is supposed that the difference in pressure which is quickly brought about, perhaps in the course of a few seconds, as the storm center passes over a given point may, amount to as much as is represented by from two to four inches in the height of a barometer. The result is, that the air within the building suddenly presses outward with a measure of violence which may lead to the simultaneous disruption of all the outer walls. At the same time the uprush of the current in the center of the whirl may lift the fragments and scatter them far and wide.

So far the only protection which has been devised to insure the safety of human life in the path of the tornado consists of underground chambers near the dwelling, in which the people may find safe refuge during the brief visitation of the storm. It seems likely, however, that a method of building can be contrived which will protect barns and dwellings from destruction, except, perhaps, in the more violent movements. In general the timber houses which prevail in the tornado district are apt to have exceedingly frail walls; the method of building gives them little strength against the thrust of the wind. If these parts of the house were so built as to resist a pressure of say four hundred pounds to the square foot, it is not likely that they would be thrust in or out by the violence of the storm. An additional protection could be secured by having the edifice provided with large windows, which would, on being blown clear of their sashes, diminish the difference in the pressure which comes from without when the edge of the storm strikes against a house, and from within when the center passes over it. It is particularly desirable not to have extensive cellars beneath the building, and to have such underground spaces provided with large communications with the open air, the doors of which open outwardly. There should be no considerable closed spaces in the attics of buildings which are to be made tornado-proof.

By the use of precautions of the nature above described, it appears possible to reduce the damage done to buildings and the

consequent loss of life arising from these tornadoes to a point where it will not exceed that which is effected by lightning. Damage done to the forests and to the standing crops of the fields appears to be inevitable, though fortunately, owing to the narrow path of the storm, it is likely in any one season to affect only an inconsiderable territory. The distribution of tornadoes in the West appears to indicate that they most readily originate in treeless districts, and are most destructive in those untimbered fields. There is some reason to hope that, as the area of forest land is by artificial plantings gradually extended over the prairie district, the number and violence of these convulsions may be in a measure abated.

The last important group of American storms is commonly known by the name of blizzards. These consist of northerly gales which follow in the wake of the cyclones that traverse the continent. These winds may blow at all seasons, but have the greatest energy in the winter season. Blizzards occur in all the region east of the Rocky Mountains, they are menacing only in the valley of the Missouri and of the upper Mississippi. Although the wind of a blizzard often attains a high velocity, its violence is rarely so great as to endanger even the poorly constructed buildings which are commonly erected on the farms in this part of the country. The evils which they bring are due to the intense cold of the air and to the blinding snow which commonly attends the storm. As they generally appear very suddenly after a period of comparative warmth, men and cattle are often lost in the fields and perish within a short distance of shelter. With an effective system of storm warnings it will be possible to advise the people as to the times when these calamities are to be expected. Notice can in most cases be given of their coming at least twelve hours in advance of the disturbance. As the rural life of the blizzard district becomes organized with reference to the climate, there is reason to believe that the damage due to this class of storms will gradually become unimportant.

Although the foregoing catalogue of the storms which affect North America may appear formidable, these atmospheric accidents do not seriously affect the fitness of its fields for the uses of man. The evils arising from these perturbations of the air are in a way counterbalanced by the unusual stability of the earth and the absence in our country of destructive volcanic eruptions. Moreover, much of the damage to shipping along the coasts, as well as to the interests of man in the inland region which these

perturbations of the atmosphere inflict, can be avoided through the aid which the General Government is now giving and will afford in ever-increasing amount to the people. Storm warnings are already of great help to the sailor, and the Federal life-boat system has very much diminished the loss of life and property which shipwrecks bring about. With the complete organization of our system of weather signals we shall soon afford to the people of the Mississippi Valley due notice of danger from storms which occur in that part of the continent.

CHAPTER IX.

THE FORESTS AND THE LUMBER INDUSTRY.

THE effects of a forest-covering on the general physical conditions of a country are very great. Before describing our North American woods it will be desirable for us to note some of the most conspicuous ways in which this influence is exerted. The most immediately recognizable action of forests is that which they have upon the temperature conditions of a country. All who are familiar with the woods have noted the singular coolness of their shade in the heated season, and the relative warmth in the winter time which is found beneath their branches even when they are bare of leaves. In summer there is often a difference at midday of as much as 8° or 10° Fahr. between the temperature within a forest and that of the neighboring open fields. In winter the variation is less, yet it is still considerable. A careful study has shown that the equalizing effect of forests composed of different species varies greatly. It is least in the case of the narrow-leaved species, such as the pines and firs, and is greatest in woods where the shade is due to the broad-leaved forms, which have a dense foliage such as the beeches afford.

The conservative effect of the forest on temperature in regions of considerable snowfall is also great, for the reason that the snow within their recesses is preserved from melting in the warmer days of the winter, and may retain a considerable depth long after it has disappeared on the open ground. Thus forests tend to make the climate of a country, as far as its temperature is concerned, much more uniform than it would otherwise be. Another important influence arising from the presence of great forests is found in the restraint which they put upon the movements of the rain water. When the rain descends upon the trees a good deal of the water is retained on the leaves, branches, and trunks, and does not find its way to the ground, but evaporates from the mass of the vegetation. It is likely that in the growing season, especially after a period of drought, near an inch of rainfall may,

if it come in gentle showers, be thus absorbed by the living vegetation or retained upon its surface.

The water which penetrates to the surface beneath the canopy of the wood enters the thick, spongy mass of decayed leaves, twigs, and trunks, and the coating of mosses and other lowly vegetation which commonly occupies that area. In a primeval forest, particularly where the trees are of the broad-leaved species, this mat often has the thickness of a foot and a half or two feet, and can store within its interstices a large body of water. Except where this mass is frozen, the rainfall is rarely so great that the water is not effectively retained and prevented from flowing over the surface. Even in districts where in a single day as much as six inches of rain may fall, we may often travel for a distance of half a mile through the woods without finding a place where the surface waters have gathered in sufficient volume to break up the forest mat or even to sweep away the annual accumulation of leaves. On a neighboring and similarly placed area of tilled ground it would be impossible to find a a square rod which did not exhibit the scouring action of the streams. The most immediate effect arising from this spongy nature of the coating which the forests accumulate and preserve on the surface of the earth is found in the fact that the rain water within the areas which are thus covered is for a considerable time retained near where it fell, and is only slowly yielded to the rivers.

There are several important consequences arising from the retention of the water in a forested area. In the first place, much of it is immediately appropriated by the roots and conveyed in the sap channels to the leaves, where it is evaporated again into the air. Perhaps a yet larger part passes into the atmosphere from the surface of the decaying vegetation, which, owing to its numerous interstices, presents a large area to the air. In this way our forests preserve even in dry weather the humid air which characterizes their recesses when that of the neighboring open country may be relatively very dry. Perhaps the most important effect, however, is found in the influence which the forest mat exercises on the protection of the soil from the destruction which inevitably overtakes it wherever it is exposed to the direct assault of the falling rain or to the action of the streams into which it quickly gathers wherever the area is not protected by a thick coating of vegetation. On any tilled field we may readily observe in a time of heavy rain that much of the soil goes

Flood of 1865 at Rochester, New York.

away in the outflowing water, which is rendered exceedingly turbid by the detrital matter which it contains; while in the areas of forest where the surface has a similar slope to that of the plowed ground the streams yield only clear waters, or at most those which are slightly stained with decayed vegetable matter. It is thus often easy to determine whether a given valley is the seat of tillage or not by the mere inspection of the stream which drains it after a time of heavy rain. If it contains extensive plowed fields, the existence of such areas will be shown by the excessive muddiness of the water. If it is covered with unbroken forest, even the most violent rainstorms will not perceptibly cloud it with sediment.

While some of the effects due to the peculiar conditions which forests afford are limited to the ground that they occupy, others are propagated very widely, and they influence the state of remote lands lying in the river system in which the woods are placed. An excellent instance of these far-reaching consequences of certain forests may be found in the valley of the Ohio River. When this stream was first visited by people of European race, the greater part of the area—all of its upland districts, indeed—was occupied by a great forest which at that time was one of the noblest woods ever seen by man. As the climate of this district is relatively cool and the rainfall abundant, the forest mat was deep and of a spongy nature. The rains which fell upon it were gradually delivered to the rivers, which then maintained a tolerably steadfast flow for the reason that it required many weeks, or even months, for the storm waters to find their way to the main river. As the process of clearing away these primeval forests has extended, as it has in a rapid manner during the present century, the evils arising from the ever-increasing rapidity with which the rain-water is delivered to the main channels of the river system progressively advance. Although these channels have been steadfastly widened until they can bear a tide of water perhaps one third greater than that which they ever contained in the primitive state of the country, the seasonal floods continually gain in height and increase in destructive power as the forests of the country are cut away.

Although the retention of the rain water in the forested area of the Ohio and many other of our rivers, and its slow movement to the sea, were in the main due to the envelope of vegetation in its living and decayed state, something of the gradual flow was brought about by the dams which the beavers constructed in the

olden state of the country. Before the coming of the whites, these interesting creatures abounded throughout this valley. Along all the streams where the fall was not so steep as to make their construction impossible, they erected numerous dams, which were so built that they held the water in an imperfect manner, allowing it to accumulate in times of flood and to be gradually discharged during the period when the rainfall was scanty. As these creatures found their food in the bark of the forest trees, they may be regarded as secondary products of the forest, and thus should be reckoned as a part of the woodland condition.

It is a most unfortunate circumstance connected with man's relations to the under earth that he must strip away the natural protection which the forest growth affords the soil before he can win his subsistence from the earth. The result of this alteration is the more or less rapid depreciation of the soil and the increase in the destructive power of the river floods. Where the basin occupied by the stream is of small area, and the river discharges directly into the sea, the effect arising from the removal of the forest, though always sensible, may not be of serious consequence. When, however, the basin has a great area, as in the case of the Mississippi River, when many streams conjoin their waters and these flow for a great distance through alluvial plains, the removal of the woods may lead to widespread and destructive floods in the time of heavy rain, and to a great reduction in the amount of water discharged during the dry season.

It is a commonplace fact that all civilized peoples depend in an intimate way upon the forests for the supply of materials which enter into almost all their constructive work. Although with the advance in the arts the amount of the metals, particularly of iron, which enters into construction of various kinds, is ever increasing, the demand for timber appears in no wise to diminish. On the contrary, our forests are more and more continuously searched for varieties of wood which may serve particular purposes of ornament or utility. The increase in the consumption of mineral fuel, coal, petroleum, and natural gas, has, it is true, decreased the ancient demand upon the woods for the supply of fireplaces, but so far as relates to all other needs the requisitions which are made upon the resources of the forest show no sign of diminution. It is evident that for all the foreseeable future of our kind the timber trees must be looked to as sources of supply for many of our most important arts. To meet this demand for construction woods, which generally require half a century or more for their

growth, and at the same time to secure a sufficient area for tillage, affords one of the most difficult and perplexing questions which civilization has to encounter. While this is in all countries a serious problem, the question is in North America of a more critical nature than in any other of the great lands.

Although the continent of North America contains some of the noblest forests in the world, and is remarkably well supplied with valuable species of trees which afford construction woods, it has a larger area of fertile lands which are unprovided with timber than any of the other continents except Asia.* Owing to the prevailingly arid nature of the climate over a large part of the Mississippi Valley as well as of the Cordilleran district, and to the dry character of the summers throughout almost all the inhabitable parts of the country, forest fires often spread with great rapidity and devastate great tracts of wood. The annual loss from this cause probably amounts to not less than five million acres of timber. Moreover, in many parts of the country, particularly those regions in which the rainfall is small or moderate in quantity, the primeval woods when burned away can not be restored, the land remaining either unoccupied by trees, or possessed by a stunted growth of species which have no value except for firewood.

With this preliminary sketch concerning the conditions and influences of forests—a sketch which, though brief and inadequate, may serve to show the reader something of the importance of this natural covering of the earth—we will now proceed to a general account of our American woodlands as regards the distribution of the areas and their importance to man.

The southern portion of the continent of North America, from the Isthmus of Darien northward to central Mexico, is occupied by forests of tropical nature. The species of trees are altogether different from those which are common in the portions of the continent which are visited by frosts. The woods of this area afford many valuable species of trees which are of importance in the arts, such as mahogany and other decorative timbers, as well as a number of species which afford dyestuffs, such as logwood. These forests of equatorial character extend northward along the coast lines of Mexico to near the borders of the United States.

* In the forests of North America, according to Sargent, there are four hundred and twelve arborescent species. Of these, two hundred and ninety-two species belong to the Atlantic region, and one hundred and fifty-three occur within the limits of the Pacific region. Ten species cross the continent.

Near that line, however, their southern character gradually becomes altered through the introduction of more northern species. The central portion of Mexico is a comparatively timberless country, for the reason that it has a rather arid climate. The forests of this interior district become more and more scanty, until, near the southern border of the United States, they almost entirely fade away. The tropical belt is continued in characteristic form of woods within the limits of the Federal Union in the southern portion of the Florida Peninsula. On the Keys from the southern extremity of that archipelago to the neighborhood of Jupiter Inlet and along a narrow belt of the mainland, we find an assemblage of trees which gives the forests the character essentially like those of Cuba or of Yucatan. This peculiar outlying tropical wood of southern Florida owes its implantation and its maintenance to the peculiar influences of the Gulf Stream, which not only conveys to the land the temperature of the tropics, but is continually bearing the seeds from the forests about the Caribbean to this more northern shore. Characteristic tropical species occupy the Florida coast from the southern shores of Tampa Bay on the west to Cape Malabar on the eastern coast. Nearly one fourth of the arboreal species of the United States are limited to this small coastal area of Florida. In it the several species of palms and mangroves attain a considerable growth, though they are somewhat dwarfed by their relatively northern position.

North of the tropical forest the massive woods of North America become divided into two great coastal areas which circle about the vast relatively open country which lies to the west of the Mississippi and extends thence to near the Pacific coast. North of the United States these woods of the East and West develop farther inland, and in the region about Lake Winnipeg the cooler and moister climate enables the forest to cover the whole land and extend northward thence to the part of the continent where the trees are stunted or their life rendered impossible by the brevity of the summer. Following the classification of American forests which is given by C. S. Sargent in his report on the Forests of North America in the publications of the tenth census, Washington, 1884, we may divide the forests of the United States and Canada as follows :

In the words of Prof. Sargent, this classification may be thus made : " The North American continent, or that part of it situated north of Mexico, which will alone be considered here, may be

conveniently divided, with reference to its forest geography, into the Atlantic and Pacific regions, by a line following the eastern base of the Rocky Mountains and its outlying eastern ranges from the Arctic Circle to the Rio Grande. The forests which cover these two divisions of the continent differ as widely, in natural features, composition, and distribution, as the climate and topography of eastern America differ from the climate and topography of the Pacific slope. The causes which have produced the dissimilarity of these two forests may be sought in the climatic conditions of a geological era earlier than our own, and in the actual topographical formation of the continent; they need not be discussed here.

"The forests of the Atlantic and Pacific regions, dissimilar in composition in the central part of the continent, are united at the north by a broad belt of subarctic forests extending across the continent north of the fiftieth degree of latitude. One half of the species of which this northern forest is composed extends from the Atlantic to the Pacific; and in its general features, although differing east and west of the continental divide, in conformity with the climatic conditions peculiar to the Atlantic and Pacific sides of the continent, still possess considerable uniformity. The forests of the Atlantic and Pacific regions are also united at the south by a narrow strip of the flora peculiar to the plateau of northern Mexico, here extending northward into the United States. Certain characteristic species of this flora extend from the Gulf of Mexico to the shores of the Pacific, and while the peculiar features of the eastern and western slopes of the interior mountain system of the continent are still maintained here, the Atlantic and Pacific regions of the Mexican forest belt possess many general features in common. Typical North American species, moreover, peculiar to the forests of the Atlantic or of the Pacific, mingle upon the Black Hills of Dakota, and upon the Guadalupe and other mountains of western Texas, the extreme eastern ridges of the Rocky Mountain range, and the outposts between the Atlantic and the Pacific regions."

Taking first the forests which lie upon the eastern portion of North America, which we may for convenience term the Atlantic district, and following in a general way the account given by Prof. Sargent in the above-mentioned report, we may note, as we proceed northward, these tolerably characteristic divisions of the area, viz.: In the extreme south we have the small field occupied by the semitropical woods of southern Florida, the peculiarities

of which have already been sufficiently noted. North of that region comes the deciduous forest, or that composed of broad-leaved trees, which shed their leaves in the autumn, and which occupies a great area in the basin of the Mississippi and along the lowland of the Atlantic. On its southern boundary this broad-leaved forest merges into the southern maritime pine belt, which occupies a large part of Florida and extends along the lowlands which border on the Gulf of Mexico to the Mississippi River, and occupies considerable areas in western Louisiana, Arkansas, and eastern Texas. In the more characteristic portions of this pine belt the forest is almost entirely occupied by the long-leaved pine, but in specially characterized areas of soil the palmettos, of which one species is of fine dimensions, and the live-oaks and other species flourish. Here, too, the bald cypress of the swamp lands attains its finest growth. The characteristic deciduous trees of the Mississippi and Atlantic plain land are species of oaks, walnuts, hickories, the noble tulip tree, the magnolias, and beeches, all of which forms attain stately dimensions. The other broad-leaved trees of this wood which deserve mention are the cherries, sassafrasses and coffee-nut, the hollies and the hawthorns, which, though of less majestic proportions and of relatively infrequent occurrence, are admirable elements in the woods. Besides these there are very many other less conspicuous trees, which are beautiful and often useful elements in the forest growth.

The best developed part of the Atlantic forest is found about the headwaters of the Ohio River, in the districts where the streams from the Appalachian Mountains pass out upon the great area of plains. From this district westward the woods gradually diminish in luxuriance and in the variety of their species, until in the region west of the Mississippi they gradually fade away, and the country takes on the open character of the great Cordilleran plain. North of the Ohio the forests more rapidly disappear than in the region to the southward, the passage from the dense woods to the prairie district being of a much more sudden nature, thick forests often growing within sight of the untimbered country. On the north of the great wood of deciduous trees lies the northern pine belt, a district in which the white pine is the most characteristic and abundant arboreal species, though the woods of it are often plentifully commingled with other narrow-leaved trees and with many broad-leaved species. This district of the white pine extends from the Atlantic coast, where it occupies a belt

Lumbering in the Northwest.

from New York to northern New Brunswick, westwardly to near the line of the Red River of the North. Throughout the area occupied by the above-mentioned tree there are many areas of black spruce and hemlock which belong to the narrow-leaved forms, and many species of the broad-leaved group, such as the basswood, the ash, the hickories, oaks, chestnuts, and walnuts, which attain their best development in the great Southern forest, extend into this area. Although this district of the white pine abounds in deciduous forms of arboreal vegetation, none of the species attain here their fairest growth; the best examples of their development occur considerably farther south.

North of the white-pine forest, extending from the Atlantic coast in northern Labrador and thence westward to the central part of the continent, lies another great wooded country which we may call the "spruce" district of eastern North America. Although this wood is tolerably continuous, and contains, besides the spruces, a considerable variety of poplars, willows, and birches, it is throughout dwarfed by the northern cold. Only here and there does it afford valuable construction timber. According to Sargent, there are only eight plants in this district which take on the characteristic form of trees; four of these species extend through to the Pacific coast, and "the remainder, with a single exception, are replaced west of the continental divide by closely allied forms of the Pacific forest." Thus this northern wood may be regarded as a connecting link between the forests of the Atlantic and those of the Pacific coasts.

Although the forests of the eastern portion of North America are among the most wide-extending and varied woodlands which exist beyond the tropics, those of the Pacific coast, occupying a much smaller area and containing a smaller assemblage of species, afford the most majestic trees and the densest growth of the continent. Prof. Sargent's account of the general conditions of these forests of the western coast is as follows, viz.:

"The Pacific forest region is coextensive with the great Cordilleran mountain system of the continent. The causes which have influenced the present position and density of these forests must be sought in the peculiar distribution of the rainfall of the region. The precipitation of moisture upon the Northwest coast is unequaled by that of any other part of the continent. It gradually decreases with the latitude, until in southern California the temperature of the land so far exceeds that of the ocean that precipitation is impossible through a large part of the year. The in-

terior of all this great region, shut off by the high mountain ranges which face the ocean along its entire extent, is very imperfectly supplied with moisture. It is a region of light, uncertain, and unequally distributed rainfall, heavier at the north and upon the coast, and decreasing gradually with the latitude in nearly the same proportion. This entire region is composed of a mass of mountain ranges with a general north and south trend, separating long and generally narrow valleys. The precipitation of moisture within the interior region is largely regulated by the position of the mountain chains. Warm currents ascending their sides become cold, and are forced to deposit the moisture they contain. It follows that while the interior valleys are rainless, or nearly so, the mountain ranges, and especially the high ones, receive during the year a considerable precipitation of rain and snow. If the distribution of the forests of any region is dependent upon the distribution and amount of moisture it receives, forests exceeding in density those of any other part of the continent would be found upon the Northwest coast; they would gradually diminish toward the south, and entirely disappear near the southern boundary of the United States, while the forests of all the interior region, from the summit of the principal coast ranges to the eastern base of the Rocky Mountains, would be confined to the summits and flanks of the mountains. These forests would be heavy upon the high ranges, especially toward the north; they would disappear entirely from the valleys and low mountain ranges. An examination of the forests of the Pacific region will show that in general distribution and density they actually follow the distribution of the rainfall of the region. These forests well illustrate the influence of moisture upon forest growth. Within the Pacific region the heaviest and lightest forests of the continent coexist with its heaviest and lightest rainfall."

The forests of the Pacific coast, as well as the related trees of the more scanty woods which are here and there found in the interior portions of the Cordilleran district, differ from those of the eastern portion of the continent mainly in the fact that they are more limited as regards their specific variety and contain fewer broad-leaved forms. On the south this interior Cordilleran wood is essentially the same as that which occupies the northern part of Mexico, where nothing deserving the name of forest exists except in the mountainous districts and near the infrequent streams. The most striking feature of this singular forest district consists in the gigantic cactus, which takes on the form of a tree. Along

the line between the United States and Mexico, in the upland portions of the higher mountains, there are some districts of dense timber including great areas of a Mexican species of cypress. The heaviest forests of this interior district are, as compared with those near the sea on either side of the continent, relatively meager. The trees are mostly of small size, and stand so far apart that they do not in the dry climate form any distinct forest bed. The best woodlands of the Cordilleran district which are beyond the climatal influences of the ocean belt lie altogether in the higher mountains, where the coolness of the climate, by diminishing the evaporation, enables the woods to preserve a tolerable measure of humidity. The best of these timbered regions of the interior lie upon the eastern slopes of the Sierra Nevada and on the flanks of the great eastern Cordilleran range commonly known as the Rocky Mountains. The slope of the Sierra Nevada which is turned toward the great central basin abounds in yellow pine and the Jeffrey pine, both of which trees attain a noble form and afford useful construction woods. The Colorado district of the Rocky Mountains, and the related elevations to the northward as far as the Canada line, abound in Engelman's spruce, one of the most beautiful of our firs; balsam and white firs, and the nut-pine, also abound in these woods.

Owing to the considerable development of woodlands in the Rocky Mountain district, which there exist in sufficient abundance to form an almost continuous forest from southern Colorado to Canada, the timberless district of the West is divided into two tolerably distinct fields—that of the great plains between the western borders of the great Mississippian forest and the foot of the Rocky Mountains and that between the easternmost portion of the Cordilleras and the Sierra Nevada, which may be termed the great Cordilleran Basin. Both these areas are almost without timber except along the paths of the streams; both are destined to continue in a permanently unwooded condition, so far at least as our American trees are concerned, as long as the climate remains such as it is at present. Some small portions of their areas, however, may prove fit for the growth of arboreal species which may be introduced from the arid lands of other continents.

On the Pacific coast there is a forest which forms perhaps the densest woodland of the world. Although it contains a much less variety of species than that which borders the Atlantic coast and occupies the eastern portion of the Mississippi Valley, it is by far the noblest growth of the continent. It occupies a narrow belt

lying within the limits of the well-watered shoreland area, extending from near the southern border of Alaska to near San Francisco. Its eastward range is everywhere determined by the measure in which the moisture-laden airs from the Pacific penetrate into the mountainous Cordilleran district. It is characteristic of these woods of the Pacific coast that they are mostly made up of narrow-leaved trees. In the northern portion of the area the Alaska cedar, the tideland spruce, and the hemlock are the most important forms. The most valuable timber tree of the district is the red fir, which has a wide distribution throughout the Pacific timber belt. In going southward through the Pacific forest the observant traveler notes that the more northern species are gradually displaced by other related forms; but the wood retains its surprising density and close-set order, the trees are often as much as from two to three hundred feet in height, and their trunks are more closely crowded together than in any part of the Appalachian forests. In California the great Pacific wood is divided into two main divisions—that which occupies the Coast Range and that which lies upon the western flanks of the Sierra Nevada, these fields being separated by a relatively timberless valley.

Although the great forest which occupies the western slopes of the Sierra Nevada is surpassed in its luxuriance by those of the coastal belt, it is remarkable for containing two of the noblest trees of North America. The great sugar-pine, a tree of wide distribution, attains in this Sierra district its most majestic development. The gigantic *Sequoia*,* the noblest forest tree in the world, surpassed in height but not in dignity by the *Eucalyptus* of Australia, is the rare but interesting tenant of this forest area. Although this *big tree* is now represented by relatively few individuals, being, in fact, the most limited in its range of any known tenant of our forests, it at one time had a wide diffusion in the western part of the continent. The restriction in the area which it now occupies is probably due to the diminution in the amount of rainfall which has come upon this country in geologically modern times.

Although there are many species of broad-leaved trees in the Pacific coast area, including a number of oaks, some of which attain a great size, none of these deciduous forms have much

* This, the largest tree in America, grows to a height of from two hundred and fifty to three hundred and twenty-five feet, with a trunk having a diameter of from twenty to thirty feet.

value for construction purposes. Their woods lack the strength requisite for use in the manufacture of agricultural implements or wagon-wheels The great extension to which the vineyards of California have attained makes a demand for wine-casks, but the oak from which they are constructed has to be brought from the eastern forests of North America. In general the trees of this district are admirably suited for such construction purposes as do not demand great strength, but which call for timber that may be readily worked and is tolerably enduring to ordinary decay. Several of the trees afford admirable material for the construction of houses or for the spars of ships. The vast size of the individual forms, and the close-set order in which the trees stand in the forest, make these woods yield a larger proportion of merchantable lumber than any others in the world. According to Sargent, "single trees, capable of producing seventy-five thousand feet of lumber, are not uncommon, while a yield of from one million to two million feet of lumber per acre is by no means rare." In the fir woods of Oregon and Washington it is estimated that the amount of the timber per acre is often sufficient to yield as much as two hundred cords of wood, or more than double the quantity which can be obtained from the most luxuriant forests of the Atlantic district.

Notwithstanding the majestic character of these Pacific coast forests, there is reason to fear that they are to vanish before the advance of our rude civilization even more rapidly than those of the eastern part of the continent have done. Although fire is everywhere a fearful enemy of our American woods, it appears nowhere to be so widespread in its destructive effects as on the Pacific coast. In 1880 over three hundred and fifty thousand acres of woodland were destroyed by fire in California, and more than a hundred and thirty-two thousand acres in Oregon.* In the drier portions of this woodland district destruction by fire means the annihilation of all forest growth. The region occupied by the timber remains a treeless desert. In the more humid districts, even in the dry seasons, the woods retain sufficient moisture to protect them in a great measure from injury by conflagration, and when burned over they are in time restored to the timbered state. Nevertheless, the restoration is generally brought about by the growth of species of broad-leaved trees which have little

* According to the tenth census, there were 10,274,089 acres of forest burned in 1879, the total value of property destroyed being $25,462,250.

value for construction purposes. These conditions make it imperative that woods of the Pacific coast, already impoverished by fire and the reckless work of the axeman, should as soon as possible be rigorously preserved.

The foregoing summary but imperfect account of the forests of North America serves to show that the woodlands of the continent, though abounding in noble timber trees and occupying a considerable portion of the country, are relatively scanty in quantity as compared with the area of lands which have value either for agricultural purposes or for mining industries. The fact is, the forest resources of this part of the New World are none too great for the present and immediate future use of its people. Owing to the fact that the best of these woods are situated near the shores of the sea or along the great water courses, it has proved easy to export the forest products to other parts of the world. From the time of the first settlement of this country to the present day the best of our forests have been heavily drawn upon for export trade. Perhaps somewhere near half of our most valuable timber has gone to foreign lands. In the eastern part of the United States there is now no tract of woodland containing as much as a million acres which has not felt in greater or less measure the effect of the axe or of fire. Even where the wood appears at first sight to be in its virgin state it can readily be observed that the more valuable species, such as the black walnut and the cherry, have already been to a great extent removed.

At least two thirds of the lowland district of eastern North America, where the soils are of a high grade of fertility and where the forests originally developed in the most luxuriant manner, have been stripped of their trees and converted into tilled fields. The consequence is, that although the original area of the Atlantic woodland is at present about half as great as it was in the primitive condition of the country, more than two thirds, perhaps as much as three fourths, of its original timber value has been lost. So far as this depreciation is due to the cutting away of valuable timber trees alone, the evil is one which will be remedied by time, for in almost all cases there are younger members of the species which come up to take the place of those which have fallen beneath the axe. Unfortunately, however, owing to the carelessness of our lumbermen and the other people who range the woods, fires are apt to originate in these districts where the ripe crop of the forest is being reaped, and these in almost all parts of the country lead to a widespread destruction. It is a well-known

fact, that after a forest has been burned over the valuable species of trees only slowly return to the area. The varieties which repossess the ground are in most cases singularly unsuited to the needs of man.

Before considering the method by which our American forests should be preserved for the use of future generations, it will be well for us to pass in rapid review the list of our more important timber trees which have a particular value in the arts. Taking first the great Appalachian woodland—that forest which extends in general from near the Mississippi to the Atlantic coast—we observe that it contains a singularly great variety of useful trees. In the number of its species it is four or five times as great as the woods of northern Europe from which our ancestors drew their supply of construction timber, and in general the individual form attains a much nobler development than the kindred species on the eastern side of the Atlantic. This great Appalachian forest contains nearly allied representatives of every important European timber tree except the cork oak of the Spanish Peninsula. It has more than a score of valuable species of which there are no related kinds in the Old World. In the time of the Middle Tertiary the European woods contained a great number of forms identical with or nearly related to the species which are now peculiar to North America. In the Miocene beds of Germany and Switzerland we may find leaves, fruits, and branches of sassafrasses, gums, and other species which have long since passed away from the European continent. The reason why these forms disappeared in the Old World appears to be found in the peculiar geographic conditions of that country. When great changes of climate have occurred in Europe, such as those which have produced the successive glacial periods, the organic forms, both plants and animals, have been driven southwardly. Owing to the existence of the Mediterranean Sea, the migration was interrupted by an impassable barrier, and thus many forms were destroyed which in North America were able to find a refuge in the southern portions of that continent. Owing to the great north and south extension of our own continent, its species of trees have been in a measure exempt from the destruction which climatal changes bring about. The forest has gone on varying in its character since about the middle of the Cretaceous period, and has thereby attained to the wide range of species which now characterizes it.

As before remarked, the American woods, like those of all other countries beyond the tropical belt, contain two important

groups of species, those of the narrow and the broad leaved divisions. In general these two groups of arboreal forms are more or less associated in the same field. Here and there, owing to some local peculiarities, sometimes of climate but usually of soil, we may find a small area possessed altogether by one or the other of the groups. In general we may say that the drier the soil in the arid part of the year the more likely it is to be occupied by the narrow-leaved trees, and this for the reason that the greater portion of the members of this group tolerate a measure of dryness in the summer and autumn which would be destructive to the species of the other group. Where the soil abounds in clay, and is therefore retentive of moisture, we usually find the field possessed by the deciduous broad-leaved forms, such as our oaks, hickories, beeches, etc. It should be noted, however, that some of the coniferous or narrow-leaved trees have become especially adapted to what we may term aquatic conditions. The bald cypress and the juniper or white cedar support an amount of moisture which can be endured by few if any of the broad-leaved forms.

In considering the more noteworthy species of American trees, we shall take first those of the narrow-leaved group, for the reason that they afford the noblest denizens of our forests, and have had, on the whole, the most important relation to the economic development of our people. Among these the white pine clearly has the first place. In the early days of the country it afforded the best construction wood which was to be had in the eastern part of the continent. North of New York, and thence to near the St. Lawrence, it formed magnificent forests, where the trees were of great size and afforded lumber at once easily worked, light, and strong. The value of this wood may be estimated from the fact that it has been more drawn upon than that of any other of our important timber trees. Next, and hardly second to the white pine, we must reckon the ordinary hard pine, which is abundantly developed in the coastal district of the Southern States, from southeastern Virginia to western Texas. Unlike the white pine, this is a very heavy-wooded tree, affording a timber which is at once very strong, hard, and durable, being suited to almost all construction uses. This tree has also a very great value, for the reason that almost all the turpentine, tar, and rosin manufactured in this country is extracted from its wood. Third among these trees of the Atlantic forest we may reckon that produced from the species of spruces, trees which are in the main characteristic of the northern part of the district, though one of them, known as

A lake filled with logs.

the black spruce, extends along the uplands of the Alleghany Mountains into North Carolina. The coniferous tree commonly known as the hemlock is a characteristic Northern form in the Atlantic forest, though it attains its greatest growth in the upper parts of the Southern Appalachians. The wood of this tree is only of moderate goodness; the principal value of the species is found in the bark, which is rich in tannin and is much used in the preparation of leather. Along with the chestnut-oak, it affords the tanning material of this country. The juniper of our Southern swamps affords a wood very valuable in cabinet-makng, in the manufacture of lead pencils, and for shingles. Although it grows readily in dry places, it attains its best development in the wet swamps of the coastal belt from Virginia to Texas. Along with this species goes the bald cypress, which is limited altogether to the morasses of the Southern States and the portion of Illinois which lies near the Ohio River. This tree affords admirable timber for a great variety of uses in which only a moderate strength is demanded. It has the peculiar advantage that it is very enduring to the influences that bring about decay. This species is remarkable for the fact that it has developed very peculiar processes from the roots which are known as knees, the summits of which rise above the level of the swamp waters in the growing season, and apparently serve to aërate the sap of the roots and so enable the plant to dwell with its foundations below the level of permanent water.

On the Pacific coast the narrow-leaved trees are much richer in species of economic importance than is the same group in the Atlantic forests. All, indeed, of the valuable timbers of that region, those which claim any place in the export trade and which are most serviceable for domestic purposes, are found among these forms. First in value among these must be reckoned the redwood, but near to it in importance are to be accounted the noble firs of this belt. Owing to the great size of the firs and pines of this coast, and to the presence in it of the gigantic *Sequoia*, these Pacific coast forests must be reckoned as the finest coniferous woods of the world. There are many other species of narrow-leaved trees which have in the Eastern and Western forests a considerable place and are of use for local purposes. Among these we may note the pitch pine, the Jersey pine, and the common yellow pine of the Southern States, which are much used for various construction purposes. The loblolly, or old field pine of the coastal belt from Delaware to central Texas, though not affording

a valuable wood, is an interesting tree, owing to the fact that it has the peculiar power of rapidly spreading over fields which have been abandoned by tillage. It appears to have a more combative nature than any other narrow-leaved form. If the fields of the district in which it dwells were left untouched by the plow for as much as a century, they would to a great extent be returned to the state of forest by the growth of this species. This species is, in this regard, in striking contrast to almost all the other coniferous trees, which usually win their way very slowly into the ground from which they have been dispossessed.

Among the broad-leaved trees of North America we must, on account of their commercial importance, give the first place to the oaks, many species of which afford timber of the greatest economic value. While in Europe there are only half a dozen species of this group, North America, from northern Mexico to Canada, contains six times as many of these forms. Of all the American oaks, the white oak is clearly the first in importance. Although the center of the development of this noble tree is in the valley of the Ohio River, it extends from northern Maine and the valley of the St. Lawrence to central Texas. The tree sometimes attains a diameter of six feet or more, and occasionally rises to the height of a hundred and fifty feet. For the construction of all sorts of carriages, for the uses of the cooper and the manufacturer of agricultural implements, it is admirably adapted. In fact, the manufacturing industries of this country in which timber enters into combination with iron have come to depend upon this tree to a greater extent than upon any other species. Unfortunately for the future of these industries, the white-oak forests are in process of rapid exhaustion. A careful study of the woods in Kentucky, where this species attains about its best development, makes it plain that where the trees are cut away, even though the forest be left in the state of nature, the growth of the species is not renewed. In many parts of that State there are few young trees coming forward to replace the mature individuals. The fact seems to be, that owing to the sweetness of the acorn of the white oak the nuts are devoured by the squirrels, while those of the black and red oak, forms which afford timber of little value, are allowed to sprout, and thus in time come to possess the land. As this tree is of slow growth, it will be difficult to replace it by artificial plantation. Next after the white oak in importance comes the post or iron oak—a tree of less size than its noble kinsman, but possessing many of the same valuable qualities. Third in the list of oaks

we may reckon the over-cup species, which has much the same value as the white oak; but though it ranges from Nova Scotia to Texas, and westward to the foot-hills of the Rocky Mountains, does not form great forests, but is usually scantily intermingled with other timber. A kindred form of over-cup oak, known as the swamp post-oak, occurs in the Southern States and affords some valuable wood. The chestnut oak yields not only a strong, tough wood, of close-grained character and suitable for many construction uses, but its thick, easily removed bark has great value for the tannin which it contains.

Besides the oaks which have the common habit of losing their leaves in the autumn, the more important of which have been noted above, North America contains several species of the group which hold the foliage in a green state throughout the winter. The most important of these evergreen forms is the live oak of the Southern States, which extends from Virginia to the Rio Grande, along the coastal belt. In former days the timber of this tree was greatly esteemed for shipbuilding, for which use it is equaled in value by no other species of this continent and by few in other lands. The wood is remarkably close-grained and strong. A related species, known as the maul oak, exists on the Pacific coast, and is the most valuable member of the genus in that part of the country. Among the many other species of the genus *Quercus* which characterize and enrich the forests of North America, there are forms which afford valuable wood, the nature of which is not yet well determined by practical use. When the widely distributed and valuable species now so extensively employed in our arts become rare, these little used varieties will doubtless prove of great value to our people.

Next after the group of oaks, the form known as the tulip tree, or yellow poplar, deserves the first place in this account of our American woods. It is perhaps the noblest inhabitant of the Atlantic forests, sometimes attaining a height of near two hundred feet, with a trunk of from six to twelve feet in diameter. Although the wood is brittle, it is light and easily worked, and is suited to a great variety of uses where endurance to decay is not of first importance. This form is singular in the fact that it is the sole member of its group in North America, though it has a very wide distribution, extending from southern Vermont to near the seaboard of the Gulf States, and thence westerly into the central portions of Missouri and Arkansas. In most cases where a genus of trees has such a wide range, we find that the form is divided

into several varieties or species, each characteristic of a particular part of the field; but although the lumbermen note certain variations in the character of the timber, the tree, so far as its external characters are concerned, is singularly invariable.

The group of trees which contains our walnuts, pecans, and hickories affords, in addition to the edible nuts which they produce in great quantities, a number of varieties of very valuable timber. From the hickories is obtained the greater part of the wood which is used in the manufacture of those parts of agricultural implements and carriages where great strength is required. Of the eight species which are known in this group, at least six afford valuable lumber. The black and white walnuts, though they have little value for construction purposes because of the brittle character of their woods, are greatly prized on account of the beauty of their color and the fine polish which can be given to it with relatively little labor. The wood of the black walnut particularly has long maintained a higher price in the market than any other American timber. Where the tree occasionally has a curl of grain, and can be used for veneering, a single trunk of large size may in the market command a price of five hundred dollars or more. The beeches of North America belong in a single species extending from Nova Scotia to Texas, and often forming extensive forests of great beauty. Owing to the fact that it is not durable when in contact with the soil, it is principally used in the manufacture of implements. There are half a dozen birches which abound in various portions of the North American forests. Of these the most valuable is the canoe birch, which is particularly interesting for the fact that the bark was extensively used by the aborigines in the manufacture of boats, and still serves them for this purpose in Canada. This and the other species known as the yellow and red birches, afford timber which, because of its close-grained, compact, and strong character, is extremely useful in the turner's art and for domestic furniture.

The four species of elm which occur in our North American forests have a considerable value for the quality of their timber, which is tough and generally of rather coarse grain, and serves well for the manufacture of wagon-hubs, saddle-trees, and other uses where strength and toughness are required. There are about half a dozen species of ashes in North America, some of which, particularly that known as the white ash, is, on account of its strength and compact grain, almost as valuable as hickory in the manufacture of implements. It has, however, the unfortunate

peculiarity that after a time it becomes brittle. It is, therefore, less permanently serviceable than the timber of the hickories and the oaks. There are many other broad-leaved trees which abound in our American forests, and which have a greater or less importance on account of the beauty or utility of their wood. None of these, however, have as yet entered very largely into the utilities of our civilization. We may, in passing, mention certain of these forms which promise in the future to become more important in our ever-varying industries than they have been in the past. The osage orange, a tree which is in its wild state limited to a small field in southern Arkansas, the Indian Territory, and northern Texas, is extensively used for hedges, but it is likely in the future to be extensively cultivated on account of the great strength and beauty of its wood. The timber is indeed singularly handsome, and in the part of the country as far north as the Ohio River it grows on rich soil with exceeding rapidity. Except that it is a plant of moderate size, rarely attaining to a height of more than fifty feet, it possesses all the properties of a valuable timber tree. It is perhaps the most beautiful of all our woods for interior decoration. The black locust, a plant belonging in the kinship of the beans, is, on account of its exceeding endurance when in contact with the earth and its great strength, a valuable timber in making wooden ships: the timbers are commonly pinned together with treenails made from this wood, and in this form the timber has long been extensively exported. The sycamore, or buttonwood, one of the noblest trees of the Atlantic forests, has long been used for the manufacture of tobacco-boxes. The tupelo, or sour gum, which affords a soft, strong wood, is coming into extensive use, though formerly much neglected. The cotton gum, an allied species which inhabits the deeper swamps, is one of the noblest of our trees, and affords timber valuable in the turner's art. This tree is noteworthy for the fact that it has adapted itself to the conditions of the denser swamps, where it shares the ground with the bald cypress. Like the last-named tree, it provides for the aëration of the sap in the roots by a peculiar arrangement of those parts. The greater of these underground branches are arched upward in a horseshoe form, so that a portion of their surfaces is above the level to which the swamp waters attain during the growing season. Many other species of value can not be mentioned here.

Among the most remarkable of our American trees we may reckon the group of mangroves which flourish in the tropical

forest belt of southern Florida. This tree is singular in the fact that, unlike all our other arboreal vegetation, it can grow with its roots beneath the surface of salt water. It has, in fact, become especially provided with various structures and habits which particularly fit it to occupy the marshy grounds next the sea. The seed of the plant is long and slender, often attaining a length of from six to ten inches, with a diameter of less than half an inch. At the lower end of the slender double cone it is provided with a number of little spurs or hooklets, shaped something like the flukes of an anchor. When the seed falls from the tree it generally enters the tide-swept waters, in which it floats below the surface with its lower end near the bottom. After a time of floating it becomes heavier from the water it absorbs, so that the grapnels with which it is provided catch upon the irregularities of the sea floor. The seed then at once throws out roots, and the germ pushes upward toward the surface of the water. If the depth be not more than two or three feet, the store of food in the large fruit enables the plant to attain the upper air. During this process of upward growth long runner-like rootlets are thrown off from the stem, which take hold upon the bottom in the manner in which the supports are formed at the base of a stalk of Indian corn.

When the mangrove plant is thus established, with its roots on the bottom and its leaves above the level of low tide, it sends the stem still farther upward until it attains a point a little above high-tide mark. It there forms a crown from which the true trunk rises to the height of sixty feet or more. From the crown there spring numerous long runners like the rootlets before described, which reach off through the air in a nearly horizontal direction for the distance of several feet, and then turn downward toward the water, through which they grow until they attain the bottom and take root. From their upper parts other trunks arise, and so the united wood pushes off into the shallow sea, its extension being limited only by the depth of the water or the force of the waves which it encounters. Owing to these peculiarities of the mangrove, the tree is of all plants the most effective combatant against the sea. A large part of the lowlands of southern Florida have through its action been won from the tidal waters. The plant is most interesting for the reason that more than any other of our arboreal forms it exhibits the effect of a complete adaptation of its structural features and habit of growth to the needs of its peculiar situation. The wood of the mangrove is of admirable quality; it takes a beautiful polish, and is very strong, so that it is

not only most interesting from a scientific point of view, but has a certain economic value.

Besides the trees which are to be esteemed mainly on account of their economic value, North America contains a great range of arboreal species which besides their utility afford very valuable resources for the landscape gardener. First among these we must reckon the magnolias, which are among the most superb features of the southern part of the Atlantic forest. The *Magnolia grandiflora* and the cucumber tree are the noblest of these forms, often attaining to a height of sixty feet and a diameter of trunk of four feet. Their perennial large, glossy green leaves and their beautiful blossoms give them a great decorative value. The plants belonging among the kindred of the roses, the wild plums, and hawthorns generally bear charming flowers and have a rich foliage. The American holly, though less beautiful than the European species, is still a noble tree, and has the feature, rather uncommon in American woods, of retaining its leaves in their green state throughout the winter. Besides its decorative quality, it affords a timber which is adapted to the most elaborate work of the turner, and for all other uses where it is not exposed to the weather. Although this tree rarely, if ever, surpasses fifty feet in height, with a diameter of about three feet, and only attains its best development in southern Arkansas and northeastern Texas, it has a wide range in the Atlantic forest, extending from northern Massachusetts to Florida and westwardly to the valley of the Colorado River of Texas. The *Stuartia*, or American camellia, a small tree which abounds in the mountains of East Tennessee and western North Carolina, is one of the most beautiful tenants of the Appalachian forest, and is noteworthy not only for the grace of its foliage but the exquisite form of its large white flowers. Although this plant is reckoned by Sargent, in his catalogue of American forest trees, as a bush and therefore excluded from his list of true arboreal forms, it often attains a height of twenty feet or more, and has a somewhat treelike character.

The American arboreal forms which have a value on account of their fruits or seeds are more numerous than those of the Old World beyond the limits of the tropical belt. Among the fruit-giving trees we may reckon the pawpaw or custard apple, a plant which attains a height of thirty feet or more and a maximum diameter of about one foot, and affords the largest fruit of any common North American tree. These are often from four to six inches in length; they are shaped somewhat like the banana, and

have an agreeable flavor. From them an alcoholic drink is sometimes distilled. This plant is especially interesting for the reason that it belongs to a family which, save for this species, is limited to the tropics, while the American form ranges as far north as southern Canada. The persimmon, which is represented in this country by two species, the most important of which extends from southern Connecticut to central Texas, is a tree which sometimes attains nearly a hundred feet in height, with a trunk which rarely exceeds one foot in diameter. It affords a wood well suited for cabinetmaking, and is especially valued for the shuttles of looms. It bears great quantities of fruit, the juice of which is singularly astringent and bitter until exposed to frost, when it becomes sweet and edible. It is much eaten by a great number of our wild animals as well as by man, and is made to serve in the manufacture of a beer and of brandy. The other species of this group, known as the black or Mexican persimmon, sometimes called the *chapotte*, is a small tree, attaining a maximum height of about thirty feet and a diameter of one foot. It is said by Sargent to be "suitable for wood engraving, and probably the best substitute among American woods for boxwood." The fruit of this species is less savory than that of the ordinary form. The tree is limited in its distribution to the region between western Texas and central Mexico. In 1880 the value of uncultivated nuts produced in this country was $78,540.

The nut-bearing trees of North America, the seeds of which have any value either for the food of man or his domesticated animals, are mainly limited to the botanical families which contain the oaks, the walnuts, and the chestnuts. The nuts of our American oaks are commonly more bitter and less fitted for human food than those of the Old World. They were therefore rarely eaten by the aborigines, and have never been an element of the food of European people, although their ancestors in early days made great use of the acorns from the European species. The group of the walnuts, including also the hickories and pecans, afford generally nutritious and savory nuts. Of these the pecan is by far the most edible and nutritious, the nuts being a considerable element of commerce. The tree of this species is of noble dimensions, ranging up to a hundred and fifty feet in height, with a diameter of four feet. Unfortunately, the field which it occupies is relatively small in extent; the form ranges from the western portion of the Ohio Valley to central Texas. The chestnuts of North America, including the lesser form known as the chinquapin, afford sweet

The largest load ever hauled. Ann River, Minnesota, February 13, 1892.
This load contained sixty-three logs; the weight, including sled and chains, was one hundred and fourteen tons.

and edible nuts. They are much smaller than the European species, but are esteemed by some to be more savory than those of the Old World. The common beech of this country, a noble tree, yields great quantities of the small triangular nuts which are characteristic of the genus to which it belongs. These are agreeable to the palate, and were much used by the aborigines, and sometimes enter in small quantities into our commerce. This tree affords the food which is best suited to the fattening of the half-wild pigs which range the forests of the Ohio Valley and the region immediately to the west beyond the Mississippi. In the days when the wild pigeons and turkeys abounded in this part of the world they to a great extent fed upon the nuts of this tree.

The questions connected with the economic administration of American forests are among the most serious which have to be faced by the people of this country. Hitherto the woodlands have been looked upon either as the enemies of our civilization, to be swept away by the axe and fire in order to give room for the plow, or as storehouses of valuable timber which might be drawn upon for the needs of the moment without any consideration as to the interests of the future. We have now attained a period in our national development when it becomes an imperative duty to care for the remainder of our forests in such a manner that they may protect our climate and our streams from injury and perpetuate to our children the other values which they afford. This task, which has been found difficult in all the countries where it has been essayed, is more formidable in our own than in any other land which has been occupied by our race. In Europe a large portion of the forests lie in mountainous districts, where the soil, for one reason or another, is practically unsuited for tillage, and therefore is not claimed by the husbandman for conversion into tilled fields. In our own land a very large part of the forest area which should be preserved occupies territories which are admirably suited for agricultural use, and are sure, under our existing system of forest management, soon to be brought into the state of open land.

The most serious embarrassment which is encountered by those who seek to preserve our American woods is found in the nature of the titles by which they are held. Nearly all the land in the Appalachian forest which lies south and west of the Adirondack district has passed from the control of the State or Federal Government into the hands of individual owners. These persons naturally consider their immediate interests in their prop-

erty rather than the larger questions of public weal. Although this great area of woodland has already been reduced to about half its original area in the two and a half centuries which have elapsed since this part of the country was first occupied by Europeans, there is reason to fear that the process of its destruction will in the coming century go on with much greater rapidity than in the earlier time. From 1840 to the present decade, the half century in which the development of our population has progressed with the greatest rapidity, the people have had free access to the plain and prairie country of the West, in which they have won a great empire to the plow without having to destroy the woodlands. This open region has not only afforded the home and fields for nearly one third of our people, but the surplus crops which they have produced have served to feed the population of the more eastern forested district. The consequence has been that during the last fifty years there has been no considerable work done in clearing away the woods of the Atlantic slope. From Maine to Georgia, within a hundred miles of the coast, during this half century it seems likely that the forests have gained upon the fields, and now occupy a larger portion of the surface than they did in the year 1800.

The tenth decade of this century practically closes that economically important period in the development of the population in which rich open fields in the Mississippi Valley could be had almost for the asking. In the further increase of the population recourse must once again be had to the forest lands, for in these, in the swamps, and in the irrigable areas of the arid district lie all our land reserve. So far as the next generation may be affected only by the motives which control the present, it seems certain that the Appalachian wood, as well as the great forests of the Pacific district, will be swept away with exceeding rapidity. The effect of such destruction is sure to be widespread and disastrous. The most important result in the Appalachian district will be found in the alteration in the condition of the rivers. We have already noted the fact that such streams as the Ohio are already, on account of the deforesting process, subject to more disastrous floods than they were of old. Considerable as this action already is, it is trifling compared to what will be experienced when the woods about the head waters of these streams are swept away. Hitherto the forests have been attacked mainly upon the low-lying level lands, where the rainfall is least considerable, and where the gentle slopes of the surface do not cause the waters to

hasten rapidly to the streams. In the further process of clearing the timber will be removed from the steep mountain sides, which are the seats of the greater rainfall, and where, when the trees are removed, the water will be shed into the main streams with something like the swiftness with which it is discharged from house roofs. If the mountainous districts about the head waters of the Ohio River are ever stripped of their forests in the manner which is likely to happen if the land remains in individual ownership, the floods of that valley will surely become appallingly violent. It may be impossible to maintain cities upon its banks, and a large part of the alluvial land next the stream may likewise become unfit for any use. The effects of these floods on the valley of the lower Mississippi would be such as to make it impossible to maintain the dikes which now protect the portion of the delta district which has been won to agriculture.

Although, owing to the great area of its basin and the considerable rainfall which occurs within it, the Ohio is the river which is the most endangered by the destruction of the Appalachian forest, all the streams which have their sources in this great wood must experience the same kind of injury from their destruction. The Hudson, the Delaware, the Susquehanna, the James, the Savannah, the Alabama, and a number of other less important rivers would, like the Ohio, become the seat of furious torrents during the time of heavy rains, and would be made unnavigable for lack of water in the dry season. As these streams already to a considerable extent serve as the sources of water supply for large towns, and are likely to be more used for this purpose in the future, the pollution of their waters which would be brought about by diminution in their summer flow is of itself a menacing evil.

It seems clear that the preservation of the Appalachian forest, or such parts of the area as it is imperatively necessary to maintain, can only be brought about by governmental interference. As the problem is one which concerns at least a dozen States of the American Union, it is futile to expect the separate Commonwealths to deal with it. Any effective action must come from the Federal Government. Fortunately for the end in view, this central authority has already entered on the plan of maintaining great reservations, such as the National Park of the Yellowstone Valley and that which contains the Big Trees in California. It is true that these areas were originally Federal domains which have been merely withdrawn from sale; but it is only a slight extension of

the principle to have the lands now privately owned, but which may be required for the public safety, condemned and withdrawn from private ownership. At least twenty thousand square miles of the Appalachian forest in the district south of the Hudson should be preserved from the destruction which menaces all the timber growth of this district. The precise limits and extent of these required preserves are not to be ascertained without a careful study of the district. It is possible, indeed, that it may somewhat exceed the area above mentioned.

It can not be denied that the project above suggested, under which the Federal Government would come into possession of the Appalachian forest, presents a number of difficulties which are in their nature serious. Experience shows that it is hard for the Federal authorities to guard the woodland districts of the Rocky Mountains, but on the other hand the Government lands in Alabama, which are of a forested character and contain much timber, have been tolerably well secured from trespass. There seems no inherent reason why, with a proper organization, a system of national forests in this country should not be as well administered as those of France or Germany, which are admirably cared for and yield a considerable revenue to the state. With such care as the Government could afford to devote to these woodlands they could be made extremely important nurseries of timber which would serve to supply the needs of coming generations in the valleys to the east and west of the preserve; so that, in addition to the control of the water supply for the rivers and the protection of the commerce between the States which would be thus secured, for the attainment of which there is ample warrant in the Federal Constitution, other economic advantages would be gained which the Federal power is not authorized directly to seek.

As far as legislation is concerned there seems to be no great difficulty in securing for the use of future generations a considerable portion, if not the major part, of the remaining woods of the Pacific coast and the Cordilleran region. The greater portion of these forests still remain in the hands of the Federal Government. All the larger areas should at once be entered on the statute-books as permanent reservations, from which the ripe timber alone should be removed, and this under the supervision of skilled foresters. In order to prevent the ravages of fire, it would be necessary to care for these areas in substantially the way in which the National Park is guarded. Hunting would have to be prevented, for the greater part of the forest fires originate through the care-

lessness of camping parties in search of game. There can be no doubt that such regulations will be objectionable, and for a time exasperating to our people, accustomed as they are to an exceeding freedom in the use of the wildernesses. It is, however, a choice of evils. In another generation, at the rate at which destruction is at present going on, there will hardly be a trace left of the woods west of the one hundredth meridian, and the Appalachian forest will be driven back to the more inaccessible uplands of the Alleghanies and the Blue Ridge.

The only great woodland of North America which appears to be secure from destruction is the forest of the high north in the Canadian Dominion. From the limits of the cultivable district in Canada northward to the Arctic Circle there stretches a woodland which, though of a stunted character and composed of but few species of trees, promises to endure when all the nobler primeval woods, except in so far as they are retained by the care of the Government, will have been swept away. In this northern realm the forests are tolerably secure from devastation by fire, and this on account of the brief duration of the summer drought. Though the timber of this part of the country has at present no economic value, and will have none until the waste of the more southern forests has gone much further than it has at present attained, it is certain to be greatly drawn upon in the century to come. As our population increases it will be impossible to supply the demands for timber from the fields within the limits of the United States. It may be from this indestructible northern wood that the people of the tilled portion of North America will have to draw a great part of the timber resources which they will require in a century from the present time.

Our account of the forest resources of North America would be incomplete without some discussion as to the possibilities of timber culture within its area. For a century or more Europe has ceased to rely upon the natural plantations of trees for the supply of the wood which is necessary in its arts. So far as this material is not brought from foreign lands it is now won from more or less artificial plantations. Already in this country a beginning has been made in the culture of timber, though the efforts, unguided by experience, have not been distinguished for their success. It is clear, however, that this continent is better suited for rearing trees than any portion of Europe. The advantages which it possesses are due to the prevailingly better character of our soils, to the tolerably abundant rainfall which charac-

terizes the larger part of the continent, but above all to the very great variety in the species which dwell in this country. The most of these forms are readily propagated, many of them have a great north and south range, and some of the most valuable develop in an exceedingly rapid manner.

East of the Mississippi and south of the St. Lawrence there is scarcely a county where at least a dozen species of valuable timber trees can not be readily produced. On the sandy soils of New England the white pine, which, as before noted, is perhaps the most valuable species of the Eastern forests, will in fifty years commonly attain a height of threescore feet and a diameter of a foot or more. Many of the mills of southern Massachusetts make lumber from trees which are less than half a century in age; much of it is cut from fields which in the last century were tilled. The spruces, the cedar, and the hemlock also develop with considerable rapidity in this part of the country. In the South the yellow and the pitch pine will grow swiftly on the sandy soil, and the juniper and the cypress rapidly develop in the depths of the swamps. It is likely that the valuable firs of the Pacific coast can readily be made to flourish in artificial plantations, and certain of our hard-wood species, such as the hickories and ashes of the Atlantic coast, would probably develop there, and might afford a valuable addition to the timber resources of that part of this country.

The list of the broad-leaved trees which are well adapted for use in plantations in this country is very long. Except on the timberless lands of the West, where trees have been planted within the last half century, nothing has been done in a systematic way toward making plantations of our ordinary hard-wood varieties. The Western experiments have not been very successful, at least in the region beyond the Mississippi, partly because of the excessive dryness of the climate and in part for the reason that little care has been taken in the selection of the varieties which were made the subjects of the essay. The only broad-leaved species which has been tried for a long time in the district east of the Mississippi, at least in the way of considerable plantations, is the black locust, a tree which is unfortunately subjected to the depredations of several very destructive insects. Among the broad-leaved forms which give promise of proving profitable species for plantations we may note the following, for the reason that they are of rapid growth, produce valuable timber, and will endure the conditions presented by tilled ground. Among these

we may give the first place to the nut trees belonging to the botanic order which includes the walnuts, pecans, and hickories. Among these, on account of its economic value, we must reckon as most valuable the shell or shag-bark hickory, which affords a wood of much value and nuts which bring a good price in the market, and at the same time has on soils of fair quality a rapid growth. The black walnut and the butternut also afford valuable woods and nuts, and develop rapidly. The pecan is also a tolerably swift-growing tree, but its wood is not strong; its principal value consists in its very savory nuts. Among the trees which produce fruit we may reckon the persimmon, the wood of which is of excellent quality, while the fruit has a certain commercial value.

The trees which are useful for their wood alone, and which promise to be profitable in plantations, are too numerous to mention. We may note, however, the catalpa, which grows rapidly, and affords a timber which, though not strong, is very durable, especially when in contact with the ground; the sassafras, which affords a light, brittle wood of remarkable endurance under conditions which breed decay, and which is somewhat used for fencing purposes; the osage orange, which grows swiftly in good soils, and affords a timber of excellent quality for interior uses. The white ash, which has great value for construction purposes, is also a tree of a moderately rapid growth, and endures a wide range of climate; where grown in old fields it is esteemed as of a better quality than when developed in the primeval forest. In certain parts of the country the chestnut develops well, and may prove useful for culture.

It seems likely that not less than twenty species of our American hard-wood trees will prove advantageous for extended use in artificial plantations. It is probable, however, that the most satisfactory method of forest culture in this country will not be found through the use of nurseries planted on ground previously tilled, but rather in the introduction into our primeval woodlands of trees which are to take the place of those which have been removed by the wood-cutters. Owing to the frequent droughts which in the summer season occur throughout almost all parts of North America, trees that are planted on sites where their roots are unprotected by the mat of vegetation are apt to suffer from the excessive dryness of the soil during the arid part of the year. Moreover, the intense sunlight, to which they are unaccustomed in the immature state, as well as the violent winds,

tend to retard their growth. By removing from a primeval wood the useless trees, leaving enough of the timber to afford some shade, and allowing the forest mat to remain in its natural state, all the conditions which favor the rapid growth of the most valuable timbers are commonly secured.

Some of the difficulties which have been encountered in our American experiments in the way of tree-planting have been due to a too close observance of the practices which have proved successful in the Old World. In Europe, where the droughts are rarely severe, and where the summer's heat and winter's cold are less extreme than in this country, new plantations formed in the open fields are more successful than they are apt to be in America. With us it is desirable to secure to the young plants a greater measure of protection than is commonly required in the case of plantations on the eastern side of the Atlantic.

By the systematic enrichment of our forests with young trees belonging to species which afford valuable timbers it will be possible to manifold their value as sources of economic timber. Owing to the great abundance of trees which have nearly useless wood, our American forests afford a much less return to the acre than could be given them through systematic planting. From certain studies made in the Appalachian forest, the present writer has come to the conclusion that in general the woods of that district could, through judicious planting, have their commercial value increased to the amount of at least fourfold within a century after the introduction of the new plants was effected. Not the least of the advantages which we might hope to have secured by governmental control of these woodlands would be effected through such an enhancement in the character and abundance of the timber which they contain. Twenty thousand square miles of the forest lands about the head waters of the Ohio River, properly cared for, might be expected to give by the end of the next century a better supply of timber than is now obtained from all the upland forests of the Appalachian district.

The foregoing considerations enable us to see that our American forests are in substantially the same economic relation to our people as are the harbors, the great rivers, and the inland seas of the country. They can not be properly cared for by private individuals, corporations, municipalities, or even by our separate Commonwealths. They must come under the charge of the Federal Government, a power to which is allotted by our political system the guardianship of those interests which can not other-

Trees in California overwhelmed by lava flow, and buried in ten feet of volcanic ash,
with living trees grown since, two hundred years old.

wise be conserved. Among the many elements of the rich inheritance which the possession of this continent has confided to the people of our race, the forests must be reckoned as the most precious though they are the most ephemeral. It will be an abiding shame if our people permit these gifts of Nature to be utterly wasted and destroyed. Already they have inconsiderately injured their resources; at best they can only transmit them to the future in a very impaired state. It behooves us at once to take measures which may serve to repair the unnecessary harm, and to retain all the forests which the needs of the present will in any way enable us to spare.

CHAPTER X.

THE MARITIME INDUSTRIES OF AMERICA.

PRIOR to the middle of the seventeenth century the commerce of Europe and therefore of the world, apart from the local trade of the Mediterranean states, was divided between the English, the Dutch, and the enterprising burghers of the Hanse towns. On the continent the preponderance of trade was with the Dutch. Their small territory, so situated as to form a gateway or point of embarkation for the whole of Europe, with harbors improved by extraordinary perseverance and art; the character of their population, fond of the sea, skilled in nautical pursuits, and destitute of a territorial area sufficient to invite their efforts or yield them a support in agriculture; and, finally, the possession of distant colonies in the East, whose products were peculiarly rich—all contributed to place them in advance of their competitors. The jealousy and alarm produced among English shipowners by this great and growing commerce of Holland led to the passage, in 1651, of the celebrated Navigation Acts, substantially a revival of the half-forgotten restrictions of the Middle Ages, and destined for the next two centuries to determine the maritime policy of Great Britain. A preliminary measure had been adopted the year before, excluding foreigners from trade with the colonies. In 1651 the scope of the law was extended and broadened, and upon the Restoration, in 1660, it was confirmed by the Parliament of Charles II.

The essential principles embodied in the English navigation laws were as follows: First, trade generally with England was allowed to foreigners only when trading from their own ports; second, exportation from English colonies was allowed only to England; third, all trade with English colonies was reserved exclusively to vessels English both in nationality and in construction, with a crew three fourths of which must be composed of Englishmen; and, fourth, the coast trade was reserved to national vessels.

Before the passage of these acts Dutch commerce had flour-

ished with little obstruction. Even Virginia tobacco and other products of the North American colonies were carried to Holland in Dutch ships and distributed thence to the rest of Europe. The long-voyage trade in particular was carried on chiefly by the Dutch. The effect of the act was to exclude them in great measure from this trade, and to throw it, as far as the English colonies were concerned, entirely into English hands. A further change was brought about, in respect to the direct trade between other European countries and England, by opening it partly to foreigners, but restricting the privilege to the products of their own country and to navigation from their own ports. This provision, ingeniously contrived, raised up in every maritime state of Europe a competitor with Holland for the native trade with Great Britain.

The Navigation Act was followed by the famous Dutch wars, the first in 1652, the second in 1665, and the third in 1672. These wars were undertaken upon trivial pretexts, their object being to crush by force the naval supremacy of Holland, as its commercial supremacy had already been assailed by legislation. "What matters this or that reason?" said Monk, with refreshing candor, when asked for a *casus belli*. "What we want is more of the Dutch trade." Notwithstanding the courage and skill of the illustrious admirals to whom these wars gave their opportunity, foremost among whom were Tromp and Ruyter, the power of the Dutch was broken, and from that time forth England maintained among European nations a position of leadership at sea.

Before the Revolution the thirteen American colonies had found the English navigation laws in some ways advantageous and in others detrimental. The acts virtually closed the colonial ports to foreign vessels, and thus relieved colonial shipping from all foreign competition. On the other hand, they prohibited importation to the colonies from any country but England, and the exportation of the great staples, such as tobacco, to any country but England. Such was the laxity, however, with which they were enforced against the colonists that the latter were able to maintain an extensive illegal trade in defiance of the prohibitions. This was especially true of the commerce with the Spanish possessions in the West Indies, exportation to which was practically unobstructed. An active over-sea trade was also carried on with the Catholic countries, Spain, Portugal, and the Canaries, the American vessels taking out fish and bringing back wine and sil-

ver coin. But as time wore on the lines were more tightly drawn, and colonial commerce suffered more and more from the restraints put upon it by the home Government. These restraints added new fuel to the fires of revolution, which had already been kindled by other acts of oppression.

The effect of the Revolutionary War on the merchant marine of the colonies, which thereby secured their independence as the United States, was not so disastrous as might have been expected. Many ships were lost or captured, and the gains of maritime commerce were reduced; but to offset these losses an active fleet of privateers found profitable employment in the seizure of English merchantmen, and thus kept alive the maritime spirit of the country, and supplied a revenue to the shipowners whose legitimate pursuits were suspended by the war. In 1783, therefore, the American merchant marine was in a fairly healthy condition.

During the next six years the disadvantages of the new situation made themselves felt. Before the Revolution the colonies had had open trade with their fellow-subjects in the British West India Islands. The commerce thus carried on was a very profitable business. The island colonies were supplied with lumber, corn, fish, live stock, and surplus farm produce, which the continent furnished in abundance, together with rough manufactured articles such as pipe staves, and in return the ships of New York and New England brought back great quantities of coffee, sugar, cotton, rum, and indigo. It is estimated that in the later colonial period this trade with the British West India Islands aggregated £3,500,000 per annum.

As a result of independence, the West India business was entirely cut off. The merchantmen of the United States then came in on the footing of foreign vessels, and all such vessels, under the terms of the Navigation Act, were rigorously excluded from trade with the British colonies. It was evident, however, that the sudden cessation of this trade, whatever loss it might inflict on the newly created state, would be tenfold more harmful to the islands, which had so long depended upon their neighbors of the mainland for the necessaries of life. Pitt, then Chancellor of the Exchequer, appreciated this difficulty, and in 1783 brought a bill into Parliament granting open trade as to articles that were the produce of either country. The measure failed, owing to Pitt's resignation, and the next ministry, in consequence of the violent opposition of British shipowners, passed a merely temporary act, vesting in the crown the power of regulating trade with Amer-

ica. This power was occasionally exercised by suspending certain provisions of the navigation laws, under annual proclamations, but it did not serve to avert the disaster that Pitt had foreseen. Terrible sufferings visited the population of the West India colonies, and between 1780 and 1787 as many as fifteen thousand slaves perished from starvation, having been unable to obtain the necessary supply of food when their own crops had been destroyed by hurricanes.

Apart from the unfavorable condition of the West India trade, another and more important cause had operated to check the prosperous development of American commerce. The only bond of political union at this time was that formed by the Articles of Confederation, constituting a mere league of independent States, any one of which could pass laws calculated to injure the commerce of the others. A series of confused and contradictory enactments, often retaliatory and always productive of dispute, brought the maritime growth of America almost to a standstill. It was recognized that some measure must be adopted which would bring the commerce of the thirteen States under a single homogeneous system. In fact, the Annapolis Convention, which led directly to the formation of the Constitution, had for its sole object the regulation of trade, and was itself induced by the controversy between Maryland and Virginia over the navigation of the Potomac. It was therefore directly due to commercial necessities that the Constitution devised by the Convention of 1787 went into operation in 1789; and from this period dates the beginning of the marvelous development that was subsequently attained by the American merchant marine.

In order to show the original condition of American shipping, its extension, culmination, and subsequent decline, with the important stages at which, from one cause or another, its forward or backward movement has been interrupted, the plan has been pursued of dividing the century from 1789 to 1889 into twelve periods, with tables showing for each year the amount of tonnage registered in the foreign trade, the values of exports and imports, and the proportion actually carried by American vessels. The periods are as follows:

1. 1789–1793, the first advance.
2. 1794–1810, high-water mark.
3. 1811–1814, the War of 1812.
4. 1815–1819, the reaction from the war.
5. 1820–1830, the second high-water mark.

6. 1831–1846, the first falling off.
7. 1847–1858, the period of over-production.
8. 1859–1861, culmination of registered tonnage: waning trade.
9. 1862–1865, the civil war.
10. 1866–1871, reaction.
11. 1872–1879, return to war figures.
12. 1880–1890, further decline.

First Period, 1789–1793. The First Advance. Average Proportion of Carrying Trade, 52 per cent.

Year.	Registered for foreign trade.	Exports.*	Imports.*	Total exports and imports.*	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1789....	123,893	.....	.....	.....	17.5	30.0	23.6
1790....	346,254	.....	.....	.....	41.0	40.0	40.5
1791....	363,110	$19,012,041	$29,200,000	$48,212,041	58.0	52.0	55.9
1792....	411,438	20,753,098	31,500,000	52,253,098	67.0	61.0	64.0
1793....	367,734	26,109,572	31,100,000	57,209,572	82.0	77.0	79.5

When the United States began its existence under the constitutional Government the conditions of the shipping trade were still somewhat unfavorable. The continental states of the Old World, imitating the policy of England in the Navigation Acts, had hampered commerce between their own and other countries by restrictive legislation, tending to exclude foreigners from competition. The six years that had elapsed since the Treaty of Paris were years of financial exhaustion, commercial depression, and of a government so crude and imperfect, that, but for the natural orderliness and law-abiding tendencies of Americans, their political condition would have been little better than anarchy. In other respects, however, there was much in the situation to excite in the thoughtful observer a confidence in the maritime destinies of America. The geographical position of the country marked it as the great sea power of the New World. Its interior, still unsettled—much of it, indeed, hardly explored—gave occupation in the tilling of the soil to only a small part of its population. Of the settled portion of the country, which comprised a mere strip along the seacoast, one important district, that of New England, from the natural poverty of its soil, excluded any prospect of great agricultural development, and led its people to turn

* Exclusive of coin and bullion, the exports and imports of which do not enter into these columns.

naturally to the sea. From one end of the coast to the other the thirteen States abounded in natural harbors adapted to serve as ports for mercantile vessels, and as distributing centers for the products of the interior. At intervals great estuaries indented the coast, from which navigable rivers formed a highway into the interior. The rugged, bold, and enterprising spirit of the people was peculiarly adapted to maritime undertakings. The necessities of water transportation had compelled them at an early period to turn their attention to shipbuilding, the materials for which were to be found in inexhaustible quantities in the forests of the North, while the Southern seaboard furnished naval stores in abundance. As far as natural advantages went, it would be hard to find a situation more favorable to maritime progress.

No one who has studied the course of commercial development in any country can fail to observe that, of the many forms of mercantile enterprise, shipowning is one of the most sensitive, being in the highest degree dependent upon the feeling of confidence that exists in the community. It is subject to great risks and great profits, and not the least of the qualities required to make it successful is boldness in commercial ventures. Without such boldness in some portion of its people a community can not hope under any conditions for maritime success. The sudden development of this period was therefore all the more remarkable, coming, as it did, upon the heels of so many years of discouragement. But the fact is, that the adoption of the Constitution, and still more the smoothness and certainty of its practical operation from the beginning, by raising up in men's minds a conviction that the panacea for political and commercial evils had at last been found, caused an instantaneous reaction, which was further stimulated by the act of 1790 to establish the public credit. This is the real explanation of that amazing development of maritime industry in the United States which followed immediately upon the adoption of the new scheme of government.

Considering the necessities that brought about the constitutional movement, it is not surprising that the earliest petitions addressed to Congress, and its earliest legislation, related to commerce and shipping. In fact, the very first act passed at the first session of the First Congress, with the exception of a purely formal statute in reference to the taking of oaths, was the law of July 4, 1789, entitled "An act for laying a duty on goods, wares, and merchandise imported into the United States," which contained the first provisions for the protection of American shipping. The

object of the act is indicated in its famous preamble: "*Whereas*, it is necessary for the support of the Government, for the discharge of the debts of the United States, and the encouragement and protection of manufactures, that duties be laid on goods, wares, and merchandise imported." . . .

In this act was first adopted not only the principle of protecting native products by duties on imports, but also that of protecting shipping by a discrimination in the rate of duty between goods imported in American and those in foreign vessels. It provided specifically, for example, in reference to teas imported from China or India in United States vessels, a light schedule of duties of six, ten, and twelve cents per pound on the lower grades, and of twenty cents on the higher grades. On teas imported from Europe in American vessels a higher duty was imposed of eight, thirteen, and sixteen cents on the lower grades, and twenty-six cents on the higher. On teas imported in foreign vessels the duties were fifteen, twenty-two, and twenty-seven cents on the lower grades, and forty-five on the higher. On other East India goods imported in foreign vessels an *ad valorem* duty of twelve and a half per cent was laid. A tariff was adopted comprising a schedule not so long as that of the present day, but still considerable, and it was provided that upon dutiable goods imported in American vessels a discount should be allowed of ten per cent.

The next act on the statute-book was based on the same general idea of protection to American shipping. It was that of July 20, 1789, imposing duties on tonnage, namely: on ships built in the United States and owned by Americans, six cents a ton; on ships built in the United States and owned by foreigners, thirty cents; and on ships built and owned abroad, fifty cents. These two acts, embodying the principle of a discount on the duties imposed on goods imported in American vessels, and a discriminating duty on tonnage, together with three others, one for the collection of the duties, a second for registration and enrollment, and a third assuming to the General Government control of lights and other aids to navigation, comprised the whole legislation under which the foreign commerce of this period was carried on.

One of the most important provisions of the first tariff act was that relating to the East India trade. Not only was an inducement held out to American ships to bring to America East India products, but by drawing a distinction between these goods when brought from the country of their production, and the same goods

Yacht—Setting the jib topsail.

brought from European ports, the Government put a premium upon the long East India trade voyages, of which the Americans of New England were not slow to take advantage. They had all the more reason for doing this, in that the false restrictive policy of England had closed this trade to English subjects generally, through the monopoly of the East India Company. The result was, that Massachusetts merchants, who already had some forty vessels employed in the trade, rapidly enlarged their ventures, and laid the foundation of those great fortunes which constitute the origin of the wealth of so many of the older New England families. These merchants shipped cargoes sometimes directly to the East, sometimes to intermediate ports, to be replaced by other cargoes of suitable character, and brought back for the use of their countrymen immense quantities of tea, spices, sugar, coffee, silks, nankeen and other cloths—all of them articles of great value in proportion to their bulk, and therefore yielding heavy profits in the carrying trade; and whatever did not find a market at home was reshipped from New England ports and sold at Hamburg or other commercial centers of northern Europe. It may be said that the marked commercial feature of the period was the development of this trade. It was the era of which Hawthorne speaks in his famous description of the Custom-House, in the introduction to The Scarlet Letter, where he calls up "the image of the old town's brighter aspect, when India was a new region, and only Salem knew the way thither."

In 1790 an act was passed for the government and regulation of seamen. This act embodied the best usages then prevailing in reference to the employment of seamen, and made it the subject of specific requirements and prohibitions. A written contract was to be entered into with the seamen, specifying the voyage and the rate of wages. In the absence of the shipping articles required by law, the master had no control over his men, and was compelled to pay for their services the highest current rates, the ship itself being made liable for wages. Masters were forbidden, under heavy penalties, to abandon native mariners in a foreign country; but if, after contracting, the seamen deserted, they were liable to forfeiture of wages, and could be brought back under compulsion. This act, with subsequent modifications, forms the basis of existing legislation in regard to seamen.

In the same year the tariff was revised and additional duties were imposed. A modification was also made in the method of exacting discriminating duties on goods imported in foreign ves-

sels. The discount on imports in American vessels was discontinued, and a general addition of ten per cent was made to the rates of the tariff, when the importation was in foreign ships. It differed from the old law, which provided a scale for foreigners and a discount for Americans, in establishing a scale for Americans, and attaching a supplementary imposition for foreigners. The principle, however, remained the same.

In 1793 occurred a slight falling off in the amount of tonnage registered for the foreign trade, which up to this time had shown a steady and very marked development. It is possible that this was due to the alarm caused by the conclusion of the treaty between Algiers and Portugal, by which the Algerine corsairs became free to renew their depredations. No serious results followed, however, and the reduction in tonnage was only momentary. There was no set-back in the proportion of exports and imports carried by American vessels, which increased without a break from 23.6 per cent in 1789 to 79.5 in 1793.

The restoration of business confidence by the legislation of the First Congress, the establishment of the national credit, the provision of a national revenue, and the success of the new Constitution, combined to a give a powerful stimulus to every form of mercantile industry, and the end of this period shows an enormous development, in a phenomenally short space of time, in all directions—shipbuilding, shipowning, and the exchange of commodities with foreign countries. New fields were opened to commercial enterprise. Not only China and India, but the northwest coast of America, invited American mariners to ventures hitherto unknown, and the year 1790 is marked as that of the first complete voyage of circumnavigation by an American vessel, the Columbia, of Boston, which, under Gray, visited Nootka Sound and returned home by way of China and the Cape of Good Hope. Two years later Gray made his second voyage, and entered the Columbia River, thus laying the foundation of the great territorial acquisitions subsequently made by the United States on the Pacific coast.

Second Period, 1794–1810. High-water Mark. Average per cent, 89.

At the opening of this period, in 1794, Jay's treaty was adopted. Among other things the treaty attempted to regulate West Indian trade. It provided for a free commerce in vessels of over seventy tons between the British West India Islands and the United States, in goods that were the growth, manufacture, or produce

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1794....	438,863	$33,043,725	$34,600,000	$67,643,725	91.0	86.0	88.5
1795....	529,471	47,989,872	69,756,268	117,746,140	92.0	88.0	90.0
1796....	576,733	58,574,625	81,436,164	140,010,789	94.0	90.0	92.0
1797....	597,777	51,294,710	75,379,406	126,674,116	92.0	88.0	90.0
1798....	603,376	61,327,411	68,551,700	129,879,111	91.0	87.0	89.0
1799....	657,142	78,665,522	79,069,148	157,734,670	90.0	87.0	88.5
1800....	667,107	70,971,780	91,252,768	162,224,548	91.0	87.0	89.0
1801....	630,558	93,020,513	111,363,511	204,384,024	91.0	87.0	89.0
1802....	557,760	71,957,144	76,333,333	148,290,477	88.0	85.0	86.5
1803....	585,910	55,800,033	64,666,666	120,466,699	86.0	83.0	84.5
1804....	660,514	77,699,074	85,000,000	162,699,074	91.0	86.0	88.5
1805....	744,224	95,566,021	120,600,000	216,166,021	93.0	89.0	91.0
1806....	798,507	101,536,963	129,410,000	230,946,963	93.0	89.0	91.0
1807....	810,163	108,343,150	138,500,000	246,843,150	94.0	90.0	92.0
1808....	765,252	22,430,960	56,990,000	79,420,960	93.0	88.0	90.5
1809....	906,855	52,203,233	59,400,000	111,603,233	88.0	84.0	86.0
1810....	981,019	66,757,970	85,400,000	152,157,970	93.0	90.0	91.5

of either party, with no higher tonnage and other duties or charges in the ports of either than were exacted by the other. It was stipulated, however, in the twelfth article, that American vessels should carry and land their cargoes in the United States only, and should be prohibited from the carrying of molasses, sugar, cocoa, coffee, and cotton in American vessels either from the British Islands or from the United States to any port of the world except in the United States. Although cotton had not yet become a considerable article of export, it was already extensively produced, and Jay's concession can only be set down to ignorance of the future of the cotton trade. As might have been expected, the provisions of the treaty governing the West India trade were never ratified.

The treaty also attempted to regulate commerce in general between the United States and Great Britain, making the illusory statement that "there shall be between all the dominions of his Majesty in Europe and the territories of the United States a reciprocal and perfect liberty of commerce and navigation." This reciprocity consisted in the provision that no higher duties should be paid on ships or merchandise of one party in the ports of the other than such as were paid for like vessels or merchandise in the ports of all other nations, nor should a higher duty be imposed in one country on the importation of articles which were the growth or the produce of the other than were required on the importation of like articles the produce of a third foreign country.

The provisions just quoted are reciprocal, but the manner in which reciprocity was put in practice rendered it of questionable benefit to the United States. The East Indian coasting trade and the trade between Europe and the British East Indies, so important to traders from the United States, continued to rest entirely upon the favor of the British Government. The restrictions of the navigation laws were not modified. The treaty also contained the following reservation:

"The British Government reserves to itself the right of imposing on American vessels entering into British ports in Europe a tonnage duty equal to that which shall be payable by British vessels in the ports of America; and also such duty as may be adequate to countervail the differences of duty now payable on the importation of European and Asiatic goods when imported into the United States in British or American vessels."

The British act giving effect to the treaty, which was not passed until 1797, made no provision for the admission of American vessels into the British colonies, and only indicated that American ships were at liberty to import into Great Britain such produce of their own States as was admissible in British vessels. It also took advantage of the stipulation in the treaty providing for a tonnage duty and for a discriminating duty on imports. The treaty, which was little more than a *modus vivendi* pending the adoption of some reasonable arrangement, came to an end in 1807. It had little influence on the maritime development of the country.

One further enactment is to be noticed in the United States during this period, in the same general direction as those which have been already mentioned. This was the act of March 27, 1804, imposing duties on additional articles, with the usual further imposition of ten per cent on goods imported in foreign vessels, and providing also that a duty of fifty cents per ton, to be denominated "light money," should be levied and collected on all foreign vessels entering the ports of the United States. The only further point noticeable in the legislation of either the United States or Great Britain is the opening of the trade between the United States and the British North American colonies in 1807.

Until the close of this period the tonnage in the foreign trade continued to show an enormous increase, rising from four hundred and thirty-eight thousand tons in 1794 to nine hundred and eighty-one thousand tons in 1810, or eight times the amount that the country possessed at the adoption of the Constitution. The proportion of American carriage in the foreign trade was maintained

at ninety per cent, as against twenty-four per cent in 1789. A slight fall in tonnage appears in the years 1800 to 1804, brought about doubtless by the war with Tripoli. This was followed, as is usually the case, by a fall in percentage, to eighty-seven and then to eighty-five per cent. From both these losses, commerce in a short time fully recovered. It is a noticeable fact, which confirms what has been already said about the sensitiveness of the shipowning interest, that an alarm shows its effect in tonnage first, and in the carrying trade afterward. As soon as shipowners become apprehensive, a decrease appears in registered tonnage, whether the apprehension is well founded or not. The proportion of the carrying trade, however, depends on actual facts, not upon alarm or apprehension. The depression in the carrying trade, therefore, as a rule, follows a year or two after the decrease in tonnage, and sometimes, if the alarm turns out to be unfounded, does not come at all. The tonnage breaks at the first note of apprehended evil; the reduction of the carrying trade only takes place when the fears that caused the falling off in tonnage have actually been realized. The alarm about Algiers in 1793, by raising insurance and making shipowners more prudent, reduced the amount of tonnage, but, as it turned out, had no material effect upon the carrying trade; whereas the depression of 1801 and 1802 in tonnage, which was caused by an actual war, was followed in the two succeeding years by a depression in the business of transportation.

Another fact that often explains these momentary fluctuations is that commerce itself may fail, in which case a reduction in tonnage necessarily follows, although the proportion of imports and exports carried by American vessels may remain the same, or even show an increase. Tonnage is affected, but not the percentage of goods carried in domestic vessels, since the same or even a greater proportion of the carrying trade may be done by Americans on a shrunken commerce. Generally, however, both are affected in the end. The usual sequence of events is first a falling off in commerce, next reduced tonnage, and finally reduced percentage. We shall have occasion to notice from time to time the recurrence of these changes.

The history of international relations during this period had an all-important bearing upon commercial enterprise. The Napoleonic wars began in 1793, continuing with slight interruptions until 1815. During most of this period England and France were the principal maritime contestants, and vied with each other in an aggressive policy toward the United States. No sooner had the

war opened, than the French in the West Indies, under a variety of pretexts, began active depredations upon American commerce. Ships were seized for the violation of arbitrary regulations of the revolutionary government, and condemned with little semblance of trial and little respect for law in French prize courts of doubtful composition and authority. So alarming did these depredations finally become, that in 1798 Congress, at the instance of the energetic Federalist Administration of John Adams, passed an act directing retaliation upon French cruisers and armed merchantmen, and the whole navy, as far as it existed, was dispatched to the West Indies to carry the law into effect. As few of the French merchantmen were unarmed, the act amounted to general reprisals upon French commerce.

A word must be said, in passing, for the navy, which at this time was a recent creation. In consequence of the depredations of the Algerine corsairs, and their apprehended renewal after the conclusion of the Portuguese treaty, Congress in 1793, after a bitter contest, had authorized the building of six frigates, for the express purpose of protecting our ships in the Mediterranean. As a concession to the opponents of the measure, whose utterances were characterized by the extreme partisan violence shown in the politics of that period, it was provided that if the treaty with Algiers, then in process of negotiation, should be concluded, work on the ships should be stopped. Under this act were built the Constitution, United States, President, and Congress, of forty-four guns each, and the Constellation and Chesapeake, of thirty-eight guns. As the sequel showed, no finer ships of their type were ever built in the world. The treaty with Algiers was concluded in 1795, but three of the frigates—the Constitution, United States, and Constellation—were finished notwithstanding, while the remaining three were built and commissioned three years later. About the same time the Navy Department was established. Other acts were soon after passed for the construction of ships, mostly of smaller size, and by the time that hostilities in the West Indies actually broke out, the Government had at its command a very respectable navy.

This attitude of the Government had a marked effect upon the commercial community. To the great satisfaction of all classes interested in shipping, the Federal authority showed a resolute purpose of affording protection, as in duty bound, to these interests, and the best evidence of this resolution lay in the building of ships of war. The leaders in Congress saw the wisdom of en-

listing in the new movement the sympathies of those who were to derive especial benefit from it, and it was accordingly provided that in the various shipbuilding and commercial localities ships of war might be built by private enterprise, which the Government should take, issuing bonds to provide for their payment. By this judicious measure local interest was actively excited, and some of the most famous of the naval cruisers were constructed under the provisions of this act, notably the Essex, built by the East India merchants of Salem, which made her first voyage around the world under Preble in 1800, and which in the War of 1812, under the command of Porter, was destined in the course of a single year completely to dispossess the British in the Pacific.

The effect of these preparations was enhanced by the campaign in the West Indies. Three pitched battles were fought with French cruisers, that of the Constellation and the Insurgente in 1798, of the Constellation and the Vengeance in 1799, and of the Boston and the Berceau in 1800. The Insurgente and the Berceau were captured, while the Vengeance, a more powerful ship than her American opponent, was beaten off and disabled. In addition to these principal actions a number of engagements took place with French privateers, resulting in the capture of over fifty vessels, all of which had been employed for mixed purposes of war and commerce.

France was not the only aggressor. Soon after the outbreak of the war the British Government issued orders in council declaring provisions for France contraband of war, and otherwise extending belligerent rights to the injury of neutrals. At this period also it put in operation for the first time against the United States the practice of impressment. The doctrine upon which this practice rested was that a British subject could not be divested of his nationality—once an Englishman always an Englishman; and if he shipped in a foreign vessel it was the right and the duty of any British cruiser to take him therefrom. The heavy demands of the British navy for seamen could not be met by voluntary enlistment, and the crews were filled up by impressment in the home ports. In their capacity of belligerents the British had the right to search all merchantmen on the high seas, and having by this means introduced themselves on board American vessels, they claimed the further right to apply their domestic practice of impressment to such neutrals as they might visit for purposes of search. The United States denied the right, made

repeated protests, and again and again attempted negotiations on the subject, but without any practical result. Month after month went by, and year after year, and still this forcible abduction of seamen from American merchant vessels continued. As time went on, the aggressors grew bolder, and where a doubt existed as to a man's nationality, if they wanted the man, as they always did, they gave themselves the benefit of the doubt. Great numbers of Americans were thus forcibly seized, and it is a matter of proof, from the files of the State Department, that there were at one time, in the years 1806 and 1807, as many as six thousand American seamen serving under duress in the British navy.

Matters had been bad enough during the early part of the Napoleonic wars, but with the year 1805 they became much worse. In this year the decisive battle of Trafalgar gave Great Britain undisputed control of the sea, while the equally decisive battle of Austerlitz gave France a like undisputed control of the continent. Between these two great powers, Great Britain on the sea and France on the land, there now began a paper war of blockades and declarations, incidentally calculated to injure the belligerents against whom they were ostensibly directed, but operating with much greater severity upon neutral commerce. In this war of proclamations Americans were the chief sufferers. The orders in council of May, 1806, declared a blockade of the French coast, from Brest to the Elbe. No pretense was made of keeping up an effective blockade throughout the whole of this territory. Napoleon retaliated by the Berlin Decree, declaring a blockade of the British Islands, at a time when it was notorious that there were no French ships of war in those waters. England thereupon, in November, 1807, issued a second order in council, declaring that no neutral vessel should trade with the ports of France or her allies, except after touching and paying duties at a British port. As the only neutral of importance was the United States, and as Sweden was the only continental state not included in the French alliance, this was a virtual prohibition of American trade with the whole of Europe. The French retaliated by the Milan Decree, confiscating all vessels that paid the duty. Between two such cross fires it was hardly possible for an American vessel to make a voyage without incurring a technical liability of confiscation.

As if this were not enough, the Administration of Jefferson, whose theory of commercial protection was of the narrowest kind, and who believed that the navy should consist only of gun-

A lake barkentine.

boats for harbor defense, decided upon the Embargo Act as a measure of retaliation against the belligerent powers. This act, which was hastily passed in December, 1807, immediately on receipt of news of the foreign decrees, prohibited the sailing of any vessel from American ports. It was for the moment a death-blow to American commerce. The audacious mariners and shipowners of New England, who had up to this time carried on their commercial voyages with great profit, running the risk of belligerent capture, now found that, if they escaped a foreign aggressor, it would only be to fall into the clutches of the authorities at home. For several months ships lay rotting at the wharves, and the trade of New England reached a condition of temporary paralysis. The falling off in commerce in the year 1808, from two hundred and forty-six millions to seventy-nine millions, and the reduction in the proportion of the carrying trade that followed in 1809, show the effects of the embargo. Tonnage also fell in 1808, but to a much less extent than might have been expected, for many American shipowners, rather than see their property laid up or confiscated, kept their vessels actively employed abroad, making voyage after voyage between foreign ports as long as the embargo remained in force. The absurdity of the law was so apparent that it was repealed early in 1809. As a measure of retaliation against the belligerent powers it was a failure, and the restrictive ordinances and counter-ordinances continued to issue in rapid succession. Nor was the system of non-intercourse which replaced the embargo any more successful.

The wonder is that under such conditions American commerce and the American mercantile marine did not come absolutely to an end. Nevertheless, such was the tremendous stimulus that had been given to mercantile activity in 1789 and the years following, aided by the creation of the navy in 1798, that our shipowners were able to take the fullest advantage of the suspension of foreign shipping business caused by the protracted war; and the end of this period, the year 1810, showed a registered tonnage for the foreign trade of nine hundred and eighty-one thousand, as against one hundred and twenty-three thousand in 1789, the highest point yet attained, and a figure that was not again equaled until thirty-five years later. The indomitable spirit of mercantile and maritime enterprise in America refused to be retarded by the menacing edicts of foreign governments. The trade of the continental powers even with their own colonies, which they were unable to maintain for themselves, fell into the hands of the

Americans, who, by carrying to a neutral port the cargoes in transit, with or without landing or transshipment, evaded the rule of confiscation as applied to neutral vessels engaging in the colonial trade of an enemy. American shipowners thus realized large profits on a trade which was in ordinary times exclusive. To meet this extension of American trade, which Great Britain viewed with concern, the prize courts of that country adopted the doctrine of continuous voyages, and under the able guidance of Sir William Scott, extended in various directions the scope of prize regulations. In spite of all these difficulties, the American carrying trade, although its profits were not regular or uninterrupted, continued to show an enormous development, and it was left to our own Government, which should have afforded it protection, to deal against it the only blow that really took effect.

Third Period, 1811–1814. War of 1812. Average per cent, 73.25.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1811....	763,607	$61,316,832	$53,400,000	$114,716,832	90.0	86.0	88.0
1812....	758,636	38,527,236	77,030,000	115,557,236	85.0	80.0	82.5
1813....	672,700	27,856,017	22,005,000	49,861,017	71.0	65.0	68.0
1814....	674,633	6,927,441	12,965,000	19,892,441	58.0	51.0	54.5

The third period comprises the War of 1812, including also the year preceding its outbreak. It was evident during this year that a collision was inevitable unless the United States was ready to submit to any form or degree of encroachment. The President, Madison, was opposed to war, but a strong party of younger men, the leaders of which were Henry Clay and John C. Calhoun, at this time coming to the front in Congress, made known their intention of pushing matters to an extreme. Madison, who was anxiously looking to a second term, was obliged to yield; and although the two principal belligerents had given equal grounds of offense, and the obnoxious commercial decrees of both were finally withdrawn or suspended, the grievance of impressment still remained, and on the 18th of June, 1812, war was accordingly declared against Great Britain. As had been foreseen, the war proved for the time a severe blow to commercial enterprise. The British navy in 1812 numbered a thousand ships, many of them ships of the line of from sixty to one hundred and twenty guns, and it was surrounded by all the prestige of that splen-

did succession of victories which had marked the campaigns of Nelson, Collingwood, Jervis, Duncan, and Howe, during the twenty years preceding. The United States navy, on the other hand, except for the *quasi*-hostilities with France in 1798 and the local campaign against Tripoli from 1801 to 1804, was without experience in war, without prestige, and without the confidence of the country, and it was regarded with unconcealed derision by its opponents. It numbered at the most twenty vessels, of which the largest was a forty-four-gun frigate, and the greater number were craft that would hardly be counted in the total of a navy like that of Great Britain. Therefore, when it happened that in the first six months of the war, three British frigates and three sloops of war were captured or destroyed in pitched battles by American vessels of the same class, a reaction took place which stirred the country to its very depths, and the naval glories of that period remain as one of our brightest national traditions to this day. To the shipowners and merchant seamen, than whom no more patriotic body of men was then or is now to be found in America, suffering as they were from the loss of business, these victories came as a direct and material consolation. The fetich of British naval supremacy had no longer terrors even for untried American mariners, and before many months had passed every sea was filled with American privateers. Although the overwhelming numbers of the enemy's fleet made it easy for him to blockade with a large force every port on the Atlantic coast, and thereby virtually to cut off transatlantic commerce, he could not prevent the escape of ocean rovers, some few of them belonging to the navy, but a far larger number fitted out by private enterprise, to prey upon British commerce. Not only did the privateers thus give occupation to the merchant marine, but the profits of their voyages were in many cases no slight compensation to their owners for the loss of the ordinary gains of peaceful traffic. Fourteen hundred British vessels were captured by privateers during the three years of the war, and the spirit of maritime enterprise was not only kept alive, but rendered tenfold more vigorous.

The course of commercial operations during this period is illustrated by the figures of the table. From 1811 to 1814 the commerce of the United States fell from one hundred and fourteen millions to nineteen millions, the last year showing it almost on the verge of extinction. Few new ships were built, many of the old ones were laid up in enforced idleness, and the tonnage

for the foreign trade showed a net falling off of ninety thousand tons. In this state of affairs foreign vessels took advantage of the opportunity to increase their proportion of the carrying trade, such as it was, and the percentage of goods carried by American vessels fell from eighty-eight to fifty-four.

Fourth Period, 1815–1819. Reaction from the War. Average per cent, 78.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1815....	854,295	$52,557,753	$113,041,274	$165,599,027	77.0	71.0	74.0
1816....	800,760	81,920,052	147,103,000	229,023,052	73.0	68.0	70.5
1817....	804,851	87,671,569	99,250,000	186,921,569	79.0	74.0	76.5
1818....	589,954	93,281,133	121,750,000	215,031,133	85.0	80.0	82.5
1819....	581,230	70,142,521	87,125,000	157,267,521	77.0	82.0	84.5

As might have been expected from previous conditions, the close of the war showed an immediate reaction. In the year 1815, the first year following the peace, the total of imports and exports advanced from nineteen millions to one hundred and sixty-five millions; the registered tonnage from six hundred and seventy thousand to eight hundred and fifty-four thousand tons, and the proportion of the carrying trade from fifty-four to seventy-four per cent.

During this period a new departure was made in shipping legislation. By the act of March 3, 1815, all the discriminating duties imposed by former laws, both on tonnage of foreign vessels and on the goods imported therein, were repealed, to take effect in favor of any foreign nation whenever the President should be satisfied that the discriminating or countervailing duties of such foreign nation, as far as they operated to the disadvantage of the United States, had been abolished.

This act, constituting nothing less than a revolution in commercial legislation, and establishing commerce on a basis of reciprocity, was followed by the treaty of July 3, 1815, with Great Britain, abolishing differential duties with respect to the direct trade between the two countries. This was the first of a long list of reciprocity treaties adopted to carry into effect the provisions of the law of 1815. Thirty-two such treaties, varying more or less in their details, have been concluded since then, the last two of them, with Italy and Germany, dating only from 1871.

The act of 1815 applied only to states which had adopted the

early American policy of discriminating duties. It did not meet the case of those which, like Great Britain, imposed a positive prohibition upon certain classes of trade—the colonial trade, for example, and trade through the ports of a third power. No such prohibitions then existed in American legislation, and a treaty of so-called reciprocity with such states was one-sided in its operation, and conceded more than it obtained in return. To meet these cases, an act was passed March 1, 1817, which virtually enacted and applied to the United States the navigation laws of 1660 of England. In this act also the door was left open for the repeal of the enactment as to states which should withdraw their obnoxious restrictions. The treaty of 1815 with Great Britain could apply only to the matter of discriminating duties, for which the law then in force made provision. But the reciprocity treaties negotiated since the passage of the act of 1817, including that with Great Britain of 1827, have covered discriminating prohibitions as well as discriminating duties, and have established the commerce of the United States on a footing of complete reciprocity.

It is not difficult to trace the influences that affected maritime industries during the period following the war. The series of restrictive incidents in the preceding ten years, including the Embargo of 1807, the Non-Intercourse Act of 1809, and the War of 1812, had to a large extent closed the American market for foreign manufactured products, and as a consequence had developed many new manufactures at home. Little protection was afforded by existing tariffs to these industries, which peculiar conditions had called into existence; and in the year 1815, which saw the close not only of our own war, but of that in which Europe had been engaged for over twenty years, the country was deluged with manufactured products from England. Prices fell immedi ately, and many struggling manufacturers suspended operations. These facts, combined with the burden of a heavy debt left by the war, and the disorders incident to a depreciated currency, brought about a disturbed and unsettled financial condition from which the country did not recover until several years later. Upon foreign commerce the effect at first was to show a large increase in the volume of imports, but the natural result of overstocking the market soon followed in a marked diminution in the foreign trade. In 1818 the effect of disturbed trade conditions became apparent in the registered tonnage, which fell off more than twenty-five per cent. It has been asserted by some writers,

but without sufficient reason, that this last reduction was due to the adoption of the principle of reciprocity. Possibly some apprehension may have been excited in the minds of occasional shipowners by this measure, but it had not yet gone into general operation, and its ultimate effect on the mercantile classes, as far as direct trade is concerned, could not be otherwise than beneficial. The real cause was that referred to above, which produced conditions highly unfavorable to an increase of shipping. The great reduction in the volume of foreign commerce, however, enabled American shipping to keep up its proportion of the carrying trade on a diminished tonnage, and even to increase it; and accordingly we find that during this period it rose from seventy-four per cent in 1815 to eighty-four and a half per cent in 1819. The registered tonnage fell off simply because the demand for the vessels fell off.

The minor legislation enacted during this period showed not only a relaxation of restrictions in favor of nations admitting us to an unrestricted commerce, but also a stiffening up of restrictions against those nations that still held out. In 1817 an act was passed increasing the tonnage duties on foreign vessels coming from ports where our ships were not admitted. On April 18, 1818, an act repealed the discriminating duties against produce from the Netherlands, Prussia, Hamburg, and Bremen, and another act in the same year closed our ports to British vessels from colonies where we were not allowed to trade. Thus the policy of reciprocity was carried to its clear and logical conclusion. Few nations, however, were as yet moved, either by restrictions or promises, to take advantage of the offer, and the policy existed chiefly on paper.

Fifth Period, 1820–1830. Second High-water Mark. Average per cent, 90.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1820....	583,657	$69,691,669	$74,450,000	$144,141,669	90.0	89.0	89.5
1821....	593,825	54,596,323	54,520,834	109,117,157	92.7	84.9	88.7
1822....	582,701	61,350,101	79,871,695	141,221,796	92.4	84.1	88.4
1823....	600,003	68,326,043	72,481,371	140,807,414	92.1	87.4	89.9
1824....	636,807	68,972,105	72,169,172	141,141,277	93.4	88.7	91.2
1825....	665,409	90,738,333	90,189,310	180,927,643	95.2	89.2	92.3
1826....	696,221	72,890,789	78,093,511	150,984,300	95.0	89.6	92.5
1827....	701,517	74,309,947	71,332,938	145,642,885	94.3	87.5	90.9
1828....	757,998	64,021,210	81,020,083	145,041,293	91.4	84.5	88.9
1829....	592,859	67,434,651	67,088,915	134,523,566	93.0	86.0	89.5
1830....	537,563	71,670,735	62,720,956	134,391,691	93.6	86.3	89.8

The next period, from 1820 to 1830, presents the second culmination of our carrying trade. During this period the disturbing causes that had existed almost from the beginning of the government, including European wars and the accompanying restrictions upon neutral trade, national war and its manifold consequences, and domestic embargoes and other destructive measures, ceased to be operative, and the result was a healthy, normal, and steady maintenance of the same high plane of commercial activity which, under other circumstances, had distinguished the period from 1794 to 1810. The proportion of commerce carried in American vessels was the same as in the earlier period, namely, about ninety per cent. The volume of foreign commerce sensibly diminished, chiefly in the matter of imports, as was to be expected from the inflation of the preceding period. Comparing the period from 1816–'20 with that from 1821–'25, the reduction in the annual average of exports amounted to eleven millions and of imports to thirty-three millions. Tonnage increased from its previous low figures until it reached seven hundred and fifty-seven thousand tons in 1828, after which a fall took place which we shall have further occasion to notice. In every respect we may say that this period represents the most flourishing condition of shipping in American history. Although since that time commerce has increased twelvefold, and although in the years preceding the civil war our registered tonnage was three times as large, yet we have never since 1830 reached the position in respect to the carrying trade to and from American ports that was maintained during this decade, but, on the contrary, have receded from it further and further.

The first line of sail packets between New York and Liverpool, known as the Black Ball Line, had started in 1816. In 1822 a second line to Liverpool was put in operation, and in the following year a third line to Hull. The manifestations of growth and prosperity in America excited the alarm of Great Britain, and for the first time it was felt by our great commercial rival that her position in the race was in danger.

Under these circumstances Congress passed the act of May 24, 1828. The text of this act was as follows:

"That upon satisfactory evidence being given to the President of the United States by the government of any foreign nation that no discriminating duties of tonnage or impost are imposed or levied in the ports of said nation upon vessels wholly belonging to citizens of the United States, or upon the produce, manufac-

tures, or merchandise imported in the same from the United States, or from *any foreign country*, the President is hereby authorized to issue his proclamation declaring that the foreign discriminating duties of tonnage and impost within the United States are and shall be discontinued so far as respects the vessels of the said foreign nation, and the produce, manufactures, and merchandise imported into the United States in the same from the said foreign nation, or from *any other foreign country;* the said suspension to take effect from the time of such notification being given to the President of the United States, and to continue so long as the reciprocal exemption of vessels belonging to citizens of the United States and their cargoes, as aforesaid, shall be continued, and no longer."

As the act of 1815 had opened the direct trade on a basis of reciprocity, so the act of 1828 opened the indirect trade on the same footing. It was supposed by its advocates that it would not only keep up the flourishing conditions then existing, but would still further improve and strengthen our commerce. The doctrine upon which it rested, and the expectations that were formed of its effect, were thus expressed by Senator Levi Woodbury, of New Hampshire, in a debate on the passage of the bill:

"By this bill we now hold out the olive branch to all. If our terms are accepted, we may obtain most of the transportation now enjoyed by foreigners in the eight or ten hundredths of our foreign tonnage; as they are now enabled to compete with us to that extent, chiefly by the discrimination they enjoy at home. . . . But whether accepted or not by nations other than those who have already adopted the basis of this bill, we shall at all events, by its passage, act in conformity to the boasted principles of our free government."

The general question of reciprocity legislation is one which may be discussed further on. It may be safely said that no other system is possible in the direct trade between two countries; but in the matter of indirect trade it has done the United States, especially in South America, a great and lasting injury. As far as the expectations afforded by the promoters of this measure were concerned, it is not a little curious to note the fact that the three years following the passage of the act saw an enormous reduction in our registered tonnage, while the proportion of our own carrying trade, which we had then maintained for eight years, namely, ninety per cent, began almost immediately thereafter to fall, and it has been falling ever since, until it has

reached almost the point of extinction. The new legislation was not the sole or even perhaps the principal factor in either the first depression or the ultimate downward movement, but it contributed to the result.

The series of reciprocity measures was completed by the act of May 29, 1830. The olive branch which was held out in the act of 1828 had not been accepted by Great Britain as far as the West India ports were concerned, and the new act was passed especially to cover this case. By the terms of this act the President was authorized to open the direct trade between these islands and the United States to British vessels without discriminating duties when Great Britain did the same to vessels of the United States, but it was expressly stated in the act that the privilege of exporting from the British colonies to other possessions of Great Britain was not a condition precedent to the granting of the privilege.

In accordance with this law, on the 5th of October, 1830, the President issued a proclamation declaring the West Indian trade opened.

The heavy reduction in registered tonnage in 1829 and 1830 was, as has already been said, in no great degree a result of reciprocity legislation. The effect of that legislation was gradual, and before the end of six years tonnage had again reached its former high figure. Neither was the Tariff Act of 1828 responsible for it. It is possible that, as in 1818, some portion of the shipping community may have become for the moment somewhat more conservative, on account of apprehension as to the consequences of reciprocity. It is possible that a similar effect may have been produced, by the increased duties on hemp and iron in the Tariff Act, in the minds of those shipowners who were figuring very closely on profits. But these influences could only have been of a superficial character. The real cause lay in the varying conditions of demand and supply whose recurrence governs the course of all trade. During the ten years from 1820 to 1830 the manufacturing industries of America underwent an extraordinary development. This increase of native resources led to a reduction, already referred to, in imports, and to a corresponding though smaller reduction in exports, amounting together to an average of over forty millions per annum, as compared with the five years following the war. During this period, while the business of carrying had been falling off to such a marked degree, the registered tonnage had been steadily increasing, competition

had become excessive, and low freights and hard times for ship-owners followed as a necessary consequence. These causes are amply sufficient to account for the sudden contraction of 1828–'30.

Sixth Period, 1831–1846. The First Falling off. Average per cent, 82.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1831....	538,136	$72,295,652	$95,885,179	$168,180,831	91.0	80.6	86.5
1832....	614,121	81,520,603	95,121,762	176,642,365	89.4	75.8	83.1
1833....	648,869	87,528,732	101,047,943	188,576,675	90.7	75.5	83.8
1834....	749,378	102,260,215	108,609,700	210,869,915	89.0	74.4	83.0
1835....	788,173	115,215,802	136,764,295	251,980,097	90.2	77.3	84.5
1836....	753,094	124,338,704	176,579,154	300,917,858	90.3	75.4	84.3
1837....	683,205	111,443,127	130,472,803	241,915,930	86.5	77.6	82.6
1838....	702,962	104,978,570	95,970,288	200,948,858	90.6	82.8	84.2
1839....	702,400	112,251,673	156,496,956	268,748,629	88.7	78.3	84.3
1840....	762,838	123,668,932	98,258,706	221,927,638	86.6	79.9	82.9
1841....	788,398	111,817,471	122,957,544	234,775,015	88.4	77.8	83.3
1842....	823,746	99,877,995	96,075,071	195,953,066	88.5	76.3	82.3
1843 *...	856,930	82,825,689	42,433,464	125,259,153	77.1	77.0	77.1
1844....	900,471	105,745,832	102,604,606	208,350,438	86.7	70.5	78.6
1845....	904,476	106,040,111	113,184,322	219,224,433	87.3	75.8	81.7
1846....	943,307	109,583,248	117,914,065	227,497,313	87.1	76.1	81.7

The sixth period, embracing sixteen years, and covering the most important changes in maritime industries, is characterized by a distinct falling off in the carrying trade. The new average, eighty-two per cent in place of ninety, was preserved with remarkable steadiness except in 1843 and 1844, when it fell to seventy-eight and below. Commerce, after making extraordinary advances between 1830 and 1839, lost a part of its gains toward the end of the period, while the registered tonnage showed a steady and marked increase, reaching in 1846 nearly the maximum figure of 1810. This rise in tonnage is noticeable as being the beginning of that extremely rapid production in shipbuilding which was destined a few years later to lead to a second and more fatal reaction. The shipping industries, on the whole, were prosperous. The world was at peace, reciprocal agreements had thrown open an extensive trade to all competitors on an equal basis, and, notwithstanding the slight fall in our carrying trade from our own ports, the era was one of prosperity.

But a new factor was now entering into the calculation. Steam vessels, whose advantages in river navigation had been demonstrated by Fulton in the early part of the century, and whose use

* Nine months.

A three-masted schooner.

had advanced rapidly since the days of the Clermont, not only in river but in coastwise traffic, had up to this period taken no hold upon long-voyage ocean commerce. In fact, it was as late as 1835 that Dr. Lardner stated the general opinion of the time in making his famous prediction as to the impossibility of transatlantic passages by a vessel propelled by steam alone. Yet it was only three years afterward that the first steamers made the voyage from England to New York, relying solely on steam power—the Sirius from London and the Great Western from Bristol, both of which arrived at their destination on April 23, 1838.

In 1839 the future of steam navigation was assured when Samuel Cunard founded the English line that bears his name. This line actually started business in 1840 with four steamers of moderate size—the Acadia, Britannia, Columbia, and Caledonia, which probably cost between four hundred thousand and five hundred thousand dollars each. The mail contract with the British Government, under which the line began business, provided for a compensation of four hundred and twenty-five thousand dollars per annum. In reference to this mail contract it may be fairly said that ocean mail-carriers should receive, especially from their own Governments, a fair compensation for the service they render. No one can dispute that proposition. It may be admitted that the compensation should not be so high as to be out of all proportion to the service, constituting a mere bounty or subsidy, and that a business which requires such extraordinary aid from the government in order to subsist must afford very extraordinary benefits in order to justify the outlay. Assuming both these propositions to be true, it is beyond question that the sum paid to the Cunard Company in its early days, amounting to about twenty-five per cent per annum on the cost of the running plant, and subsequently increased to five hundred and fifty thousand dollars, to seven hundred and fifty thousand dollars, and to eight hundred and fifty thousand dollars, was clearly a subsidy; that it was given with the plain intention of establishing firmly in English hands the transatlantic traffic; and that it accomplished the desired result. Without it the Cunard Company would possibly have survived, but it would certainly not have built up a career so monumental in its success.

This period not only witnessed the firm establishment of transatlantic steam navigation, but to it also belonged the first important step in the modern development of the marine engine—the substitution of the screw propeller for the paddle-wheel. In 1836

Ericsson made the first successful trial of the screw in a small boat called the Ogden, on the Thames. Although the device met with little favor in England, Commodore Stockton, of the United States navy, who chanced at the time to be in London, was favorably impressed by the trial, and immediately ordered a vessel to be built and fitted with a screw. This ship, named the Stockton, was finished by Laird, of Birkenhead, in 1838, and was brought to America, whither Ericsson also came at Stockton's instance. In 1843 the Great Britain, a large screw steamer of the Great Western Company, was put afloat, and the new form of marine propulsion thus became fully established. It was a long time, however, before it finally drove out the paddle-wheel, even upon transoceanic steamers.

Other important events of this period were the establishment in 1837 of the Peninsular Company, afterward the Peninsular and Oriental, and in 1840 of the Pacific Steam Navigation Company, with a line on the west coast of South America, both with heavy mail subsidies. The establishment of the latter line was due to the foresight of William Wheelwright, of Newburyport, then American consul at Guayaquil, who, after an unsuccessful attempt to secure the co-operation of American capitalists, started his enterprise in London, and thereby laid the foundation of the dominant influence on that coast of English mercantile enterprise, which has continued to our own day.

Seventh Period, 1847–1858. The Period of Over-production.
Average per cent, 72.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1847....	1,047,454	$156,741,598	$122,424,349	$279,165,947	77.2	65.3	71.1
1848....	1,168,707	138,190,515	148,638,644	286,829,159	82.9	71.1	77.4
1849....	1,258,756	140,351,172	141,206,199	281,557,371	81.4	68.0	75.2
1850....	1,439,694	144,375,726	173,509,526	317,885,252	77.8	65.5	72.5
1851....	1,544,663	188,915,259	210,771,429	399,686,688	75.6	69.8	72.7
1852....	1,705,650	166,984,231	207,440,398	374,424,629	74.5	66.5	70.5
1853....	1,910,471	203,489,282	263,777,265	467,266,547	71.5	67.1	69.5
1854....	2,151,918	237,043,764	297,803,794	534,847,588	71.4	69.3	70.5
1855....	2,348,358	218,909,503	257,808,708	476,718,211	77.3	73.8	75.6
1856....	2,302,190	281,219,423	310,432,310	591,651,733	78.1	70.9	75.2
1857....	2,268,196	293,823,760	348,428,342	642,252,102	71.8	60.2	70.5
1858....	2,301,148	272,011,274	263,338,654	535,349,928	72.0	75.0	73.7

The period we are now considering showed a still further decline in the carrying trade of America. From 83 per cent,

where it had been for sixteen years, it now stood at 72 per cent. Commerce was enormously on the increase, the total of combined imports and exports rising from two hundred and twenty-seven millions in 1846 to six hundred and forty-two millions in 1857. The employment of ships continued at a heavy rate of increase, until in twelve years it had considerably more than doubled, finally reaching two million three hundred thousand tons, registered in the foreign trade, as against nine hundred and forty-three thousand in 1846. The figures of 1810, which had so long marked a culminating point, were now left far behind.

The international legislation of this period was distinguished chiefly by the repeal of the British Navigation Acts in 1849, under the influence of Cobden, Lindsay, and other leaders of the free-trade movement, against the violent remonstrance of the ship-owners. The acts had been in force for two hundred years. That their operation was beneficial to English commerce during much of that period, especially in the early part of it, is probably true; but it is equally true that the time had come for their repeal, at least in part.

The laws embodied three distinct features, which must be separately considered, although too often confused. The first consisted of prohibitions or restrictions upon international or intercolonial trade. Certain articles of produce in Europe, and all articles of produce elsewhere, could be imported to England only in British ships, or in ships of the country where the articles were produced. Trade with British colonies was restricted to British ships exclusively, and the produce of Asia, Africa, or America could not be imported from any European country. These and other like restrictions were now swept away, and, as far as the direct trade was concerned, with good reason. In a business so open to retaliatory legislation as the international carrying trade, and so dependent not only upon domestic legislation at one end of the voyage but upon foreign legislation at the other, no principle but that of reciprocal freedom in the direct exchange of commodities could possibly be applied to the enormous traffic upon which the world was now entering. It was this principle that dictated the laws of 1815 and 1817 in the United States, and, though the second of these followed closely in terms the ancient English statute, it differed from the latter in containing a provision for its own revocation as to any state in which similar laws did not exist. The American plan had been to make the exchange of benefits in terms reciprocal; in other

words, to secure a *quid pro quo* for its concessions, and only to make restrictions where other nations refused its offer. The British, though they had repeatedly declined our offers of reciprocal concession, at length not only followed our example, but in the natural reaction from excessive conservatism went beyond it, in voluntarily sweeping away all those obsolete restrictions which had hitherto clogged the wheels of their commerce. The policy of the repeal of 1849 differed rather in method than in principle from that of America, in securing by domestic legislation the same result which the latter accomplished by international agreement. Its application to indirect trade not only did little harm to England, but by its tendency to render permanent a similar policy in America was a positive benefit.

The second feature of the new English policy consisted in opening the coastwise trade to foreigners, which was not, however, effected until 1856. What advantage was secured by this enactment is not readily apparent. The only rational grounds for such a measure would seem to be either that a state could not carry on its coastwise trade, and hence the trade suffered by the exclusion of foreigners; or else that circumstances created a virtual exclusion of foreigners, and in the absence of foreign competition nothing could be gained by a legislative prohibition, while its repeal would tend to a simplification of the regulations governing trade. Considerations of this latter kind were probably the predisposing cause of the measure in the case of Great Britain, which feared no competitor on its own ground. It is needless to say that the conditions in the United States, with the aggressive commercial spirit of England looking hungrily at American coastwise traffic, would present vital points of difference from those which in 1850 affected the controlling element in the British Parliament.

The third feature of repeal legislation at this period consisted in the free admission of foreign-built ships to British registry, by the repeal of the Registry Act of 1786. Had this measure been adopted thirty years before, it would have been a severe blow to the shipbuilding industry of Great Britain. At that time American builders competed with all the world on more than equal terms. The materials of construction were to be found nowhere else in such cheapness and abundance as in the United States; while the labor put upon the ship was of such a quality that, even with higher rates of wages, the finished product was far better and no dearer than that turned out abroad. But in 1850, as will presently be shown, the change in the character of ships had exactly

reversed these conditions. The cheap iron of England, due to the presence of suitable coal for working it, and other favorable circumstances, combined with the rapid development of mechanical skill and energy in its manufacture and use, placed that country far above all danger of competition in the production of the iron steamers which had already come into extensive use, and were clearly destined to become the vessels of the future. Hence this feature of the repeal of the navigation laws, at this particular juncture, was perfectly innocuous to the shipbuilding interest, which by the force of extraordinary circumstances was absolutely without a competitor, and therefore in a position to be unaffected by any kind of legislation. Whatever may be said of the effect of free ships upon a struggling shipbuilding industry, no analogy can be drawn from the experience of England during the last forty years.

The effect of the repeal measures may be summed up in a few words. The removal of commercial restrictions secured for English commerce a like freedom from restrictions in the ports of foreign countries, in accordance with the spirit of the times and the tendencies of modern trade development, and was thus one important factor in the growth that subsequently took place. The opening of the coastwise trade had no marked result, either beneficial or detrimental, except in so far as every measure which tends to greater simplicity and flexibility of commercial regulations is beneficial, other things being equal. The adoption of the principle of free ships, which might have been harmful in 1820, when the United States fixed the standard of the quality and cost, could do no harm whatever when cheap modern ships became, from the force of circumstances, an English monopoly; and, like the opening of the coastwise trade, it was advantageous in reducing the complexity and rigidity of commercial regulations.

In consequence of the repeal of the acts, the Secretary of the Treasury, on the 15th of October, 1849, issued a circular declaring unrestricted trade with Great Britain. But the fact was that such were the approaching conditions of competition between America and England that the United States could not carry on the race upon anything like a footing of equality; while the inability to impose restrictions upon English trade between its own ports and those of other foreign countries placed it at a disadvantage in the only field where competition was possible.

As might have been expected, the heavy mail subsidy of the Cunard Company had a fatal effect upon rival lines, and in 1846

the Great Western Company withdrew from its operations and abandoned the struggle.

About the same time occurred a new and highly important departure in the transatlantic mail service. This consisted in the establishment of a regular line of American steamships. Already, in 1845, Mr. R. B. Forbes, of Boston, had built two auxiliary screw steamers, the Massachusetts, and Edith, for this purpose. These were followed in the next year by the creation of the Ocean Steam Navigation Company, which received from the Government $200,000 a year for carryingthe mails twice a month between New York and Bremen. The two steamers of this line were the Washington and Hermann. The owners of the Black Ball Line of packets, Messrs. Charles H. Marshall & Co., about the same time built the steamship United States, as an addition to their line. Another transatlantic line in the same period was the New York and Havre Steam Navigation Company, which received $150,000 a year for carrying the mails between New York, Southampton, and Havre.

The great event of this period, however, so far as it relates to the development of the shipping industry in the United States, was the establishment of the famous Collins Line, between New York and Liverpool. Under the authority of an act of Congress of March 3, 1847, a contract was made November 1, 1847,with E. K. Collins and his associates, to run a line of steamers twice a month during eight months of the year and once a month during the other four, to carry the mails at an annual rate of pay of $385,000. The line began to run in 1850. The number of its trips and the rate of compensation were subsequently increased, running up finally to $850,000 per annum. Four steamers were put afloat, the Atlantic, Pacific, Baltic, and Arctic, whose internal arrangements were admirably adapted for ocean passenger traffic. They were constructed with a lavish disregard of cost, and fitted with what were at that time considered extraordinary luxuries. Many of the improvements still in use in the transatlantic passenger service date from the Collins line. Bad judgment and extravagance in the management of the company were shown from the start, and although the line began with every prospect of success, it was found in a few years to be running at a loss, and it eventually met with a series of disasters from which it could not recover. The Arctic, on September 21, 1854, collided with the French steamer Vesta, in a fog off Cape Race, and only forty-six out of two hundred and sixty souls on board were saved. The Pacific

sailed from Liverpool on June 26, 1856, and was never heard of again. Her fate is one of the unsolved mysteries of the ocean. In consequence of the condition of the company the mail contract was terminated in 1856, and the business was closed up. Thus ended the first, and with one or two exceptions the last American experiment, until 1893, in transatlantic passenger lines.

Another and more successful enterprise belongs to this period. In 1847 was founded the famous Pacific Mail Company, which with many and varied fortunes has continued to the present time. The line was called into being by the sudden development of the Pacific coast. Its early operations were conducted under extraordinary difficulties, which were only overcome by great skill and judgment in the management. Its first steamer, the California, left New York, October 6, 1848, for San Francisco. After the building of the Panama Railroad the company's steamers ran from New York to Aspinwall on the Atlantic coast, and from San Francisco to Panama on the Pacific. Other lines of the same Company were subsequently established to Honolulu, to Japan and China, and to Australia. The present fleet includes the following vessels, all iron or steel screw steamers:

City of Peking	5,079 tons.
China	4,939 "
Colombia	3,616 "
Peru	3,616 "
City of Rio de Janeiro	3,548 "
City of Para	3,532 "
City of New York	3,019 "
City of Sydney	3,016 "
Colima	2,905 "
Newport	2,735 "
Colon	2,685 "
Acapulco	2,572 "
San José	2,180 "
San Blas	2,180 "
Starbuck	2,157 "
San Juan	2,076 "
Clyde	2,016 "
Costa Rica	1,700 "
Barracouta	1,659 "
City of Panama	1,490 "

Notwithstanding the disastrous ending of the Collins line, the period which we are now considering appeared, and in some re-

spects with reason, to represent a great advance in the progress of maritime industry over that which had preceded it, and to be the forerunner of an equally remarkable development in the future. The tonnage registered for the foreign trade advanced at an average rate of over one hundred thousand tons per annum. Great as had been the progress made in the sixty years preceding, during which the registered tonnage had increased from 123,000 to 943,000, the developments of the period which had now been reached were far more rapid. Tonnage multiplied until it was twenty times its original amount. From carrying one quarter of the goods exported from and imported into the United States, it now carried three quarters; and although there had been periods, and considerable periods, too, when the proportion had risen to nine tenths, yet to the minds of most men a profitable carrying trade still maintained at from seventy to seventy-five per cent represented a prosperous business. Moreover, the falling off in the proportion of the carrying trade did not represent an equal falling off in the receipts of American owners on account of freights. Many of our vessels found more profitable employment in the trade between foreign ports than in that to or from the home ports, and accordingly passed all their time abroad. The Crimean War, from 1854 to 1856, occupied many European steamers in special service auxiliary to the war, and for a time made new openings for American shipping. The result of this accumulation of favorable indications was shown in an enormous increase in shipbuilding, and consequently of registered tonnage.

During nearly three quarters of a century of growth and development American ships had made a name for themselves all over the world. The sailing clipper, which for forty years had been the type and model of excellence in ocean shipbuilding, was an American product. By long practice our builders had reached a degree of skill in constructing these vessels equal to that of the finest mechanics, while the abundance and cheapness of materials of which the ships were built made the first outlay of the shipowner exceedingly small. It was in these ships that for nearly half a century not only the largest freights of the world were carried, but the finest and most profitable as well. Merchants having valuable cargoes to export would wait for the sailing of a favorite clipper, and merchants with goods to import would instruct their correspondents to wait in like manner. In these ships not only did the character of the cargoes cause profits to run high, but the insurance was low, thereby adding materially to

their value. Even as late as the beginning of the period of which we are now speaking the finer qualities of merchandise were almost wholly transported in these vessels.

American shipping had a further advantage in the *personnel* of its crews. The excellent character of American seamen was a matter of common remark in every commercial port of the world. Lindsay thus testifies to their qualities:*

"During the first half of this century the masters of American vessels were as a rule greatly superior to those who held similar positions in English ships, arising in some measure from the limited education of the latter, which was not sufficient to qualify them for the higher grades of the merchant service. American shipowners required of their masters not merely a knowledge of navigation and seamanship but of commercial pursuits, the nature of exchanges, the art of correspondence, and a sufficient knowledge of business to qualify them to represent the interests of their employers to advantage with merchants abroad. On all such matters the commanders of English ships, with the exception of the East India Company's, were at this period greatly inferior to the commanders of the United States vessels. . . .

"In confirmation of this opinion Mr. Consul Peter [British consul], of Philadelphia, states: 'A lad intended for the higher grades of the merchant service in this country, after having been at school some years and acquired (in addition to the ordinary branches of school learning) a competent knowledge of mathematics, navigation, ship's husbandry, and perhaps French, is generally apprenticed to some respectable merchant, in whose counting-house he remains two or three years, or at least until he becomes familiar with exchanges and such other commercial matters as may qualify him to represent his principal in foreign countries. He is then sent to sea, generally in the capacity of second mate, from which he gradually rises to that of captain.' . . .

"Nor were the interests of the common seamen overlooked. Boys of all classes, when fit, had the privilege of entering the higher free schools, in which they could be educated for almost every profession. An ignorant native American seaman was therefore scarcely to be found; they all, with few exceptions, knew how to read, write, and cipher. Although in all nations a mariner is considered a citizen of the world, whose home is on

* Lindsay, History of Merchant Shipping, vol. iii, p. 15 *et seq.*

the sea, and as such can enforce compensation for his labor in the courts of any country, his contract being recognized by general jurisprudence, the cases of disputes between native-born Americans and their captains have ever been less frequent both in this country and abroad than between British masters and seamen, owing in a great measure to the superior education and more rigorous discipline on board American vessels."

At the same time British seamen, the principal competitors of Americans, had a bad name—so much so that in 1843 the Foreign Office issued a circular of inquiry to the consuls, which stated: "I am desirous of gaining information in regard to instances which have come to your observation of the incompetency of British shipmasters to manage their vessels and their crews—whether arising from deficiency of knowledge of practical navigation and seamanship or of moral character."

Some of the answers received to this circular are quoted by Lindsay. H. B. M. Consul Baker, of Riga, stated: "Foreign shipmasters are generally a more respectable and sober class of men than the British. I have always been convinced that, while British shipowners gain by the more economical manner in which their vessels are navigated, they are great losers by the serious delays occasioned while on the voyage, and discharging and taking in cargoes, growing out of the incapacity of their shipmasters and their intemperate habits. I have had occasion to remark, while consul in the United States, that American vessels in particular will make three voyages to two of a British vessel, in this way having an immense advantage over their competitor; and also from the superior education, and consequent business habits, obtaining better freights and employment for their vessels on foreign exchanges." He further remarked that in several instances he had been compelled, on the representations of the consignees, to take from shipmasters the command of their vessels in a foreign port, and to appoint others for the return voyage; their constant state of intoxication rendering them wholly "unfit to carry on their duties."

It is no wonder that under such conditions American ships had acquired the foremost place as ocean carriers in the world, and that they carried the best freights at the highest rates. Although the percentage of the carrying trade in American vessels had been reduced, yet they still obtained the choicest part of the business. They were stancher and faster vessels, they carried more sail, made quicker voyages, and took better care of their

goods. Both in speed and in safety, the two essential conditions of a successful carrying trade, they were in advance of all rivals. Their officers and crews received higher wages, but so much did they excel in the highest qualities of the sailor, that fewer men were required in the service, and the running expenses were not thereby increased. Shippers preferred them, insurers preferred them, consignees preferred them, and their profits down to 1856 were enormous.

The type of ship which had been so great a source of profit for half a century to American owners was now shortly to become a thing of the past. The days of the sailing clipper were numbered; the vessel of the future was to be the iron or steel steamer. This fact had already obtained partial recognition both in the United States and Great Britain. In 1853, of the total tonnage of vessels built in the United Kingdom nearly twenty-five per cent were steamers, and a little more than twenty-five per cent were of iron. From that time on the percentage of iron ships and of steamships in the building tonnage of Great Britain steadily increased, until at the present time three fourths of the vessels built annually are steamers, and none at all are built of wood. In the United States, in 1853, twenty-two per cent of the total tonnage built consisted of steamers, but only an inappreciable portion were constructed of iron. In 1891 half the tonnage built in the United States consisted of steamers, and a little more than one fourth was of iron or steel. It is apparent, therefore, that although in 1853 we were on a level with England in the percentage of steam tonnage built, we were even at that date far behind in iron tonnage; and at the present day, when wood has been totally laid aside as a material for shipbuilding in England, we are still using it in the proportion of seventy-two per cent, while the whole proportion of our steam tonnage is fifty per cent, as against seventy-one per cent in Great Britain. It is unnecessary to enumerate the figures between these two dates, but it is enough to say that soon after 1853 we fell behind in the comparison, as far as steamers were concerned, and have remained behind ever since, while in the adoption of modern materials we have never stood anywhere near the foreign builders.

The advantages of iron or steel over wood as a material of construction, may be briefly stated. The metal gives greater buoyancy, greater space for carrying, finer lines, and increased rigidity of hull. It lasts longer, the ship which is constructed of it is better able to resist collision, and is drier and safer and faster.

The iron hull resists decay, its construction in water-tight compartments makes it almost unsinkable, and there is far less danger than in other ships from fire. The advantages of steamers over sailing vessels lie in the very conditions of speed and safety which have already been mentioned. Steamers average three times the speed of sailing vessels at sea, while their greater speed in entering and leaving port and in loading and unloading makes the proportion of time saved as five to one. As far as the conditions of safety are concerned, their ability to avoid storms and other dangers places them far above sailing vessels. Actual statistics show that they are seven times safer, looking at the number of wrecks in comparison with the number of voyages made. They are therefore more economical and more efficient. Just as the model American packet was superior to the average sailing vessel of the period which it represented, so the iron steamer was superior and in much the same qualities to the sailing packet.

Thus the iron steamers, which in the fifties Great Britain was turning out at the rate of one fourth of the whole shipbuilding tonnage, gradually increasing to one half and then to three fourths, competed with the clippers on their own exclusive ground. They injured the clippers precisely as the clippers had injured their competitors—they took away all the finer trade. In distant trading for long voyages, and for cheap and bulky freights, the wooden sailing vessels might still be run at a profit, but the cream of the business at this period was passing out of their hands.

The comparative statement which has been made above justifies the assertion that the shipping interests in the United States have been more than conservative in reference to the adoption of modern improvements in the construction of the vehicles of maritime traffic, and it explains to a great extent the process by which the foreign carrying trade, even from our home ports, has slipped out of our hands.

At this critical period American competition was placed at a disadvantage, not only by the conservatism of builders and owners, and by their adherence to the beautiful model of the sailing clipper, which had so long been their darling and their pride, but by commercial and mechanical obstacles to the development of a modern fleet. The building of wooden ships, which had absorbed the attention and employed the labor of great numbers of expert mechanics in the production of half a million tons per annum, was a totally different trade from that of iron shipbuilding which was to take its place. It required a different kind of plant, different

A clipper ship.

kinds of tools, and, worse than all, different kinds of mechanics, and they were plants, tools and mechanics of which we had comparatively few in this country. Wooden shipbuilding, although it had arrived at a nicety and perfection which constituted it a high form of mechanical art, was nevertheless essentially of that class of rude manufactures which a community may undertake with success in its earlier and more rudimentary stage of development. It had, in fact, been successfully prosecuted by the colonists before the Revolution, at a time when machinery was unknown, when co-operative industry was in its infancy, and when, in respect to many of the necessaries of life, the consumer was also the manufacturer. The construction of iron ships could not proceed from any such crude beginnings; it belonged essentially to a high state of civilization and to a community far advanced in manufacturing arts. It required a greater amount of capital for the construction of a single vessel of size than the earlier shipbuilders ever dreamed of. It required not only skilled labor in putting the ship together, but a great variety of experts in different branches of industry, through whose co-operation alone the finished product could be obtained.

In the period between 1850 and 1860 we no doubt had the elements in our population for developing a successful iron shipbuilding industry. Neither then nor since have our people shown any want of mechanical skill, or of the necessary ingenuity and enterprise to carry on with success any branch of manufacture; and, curiously enough, the recent experience of some of our builders goes to show that a good force of shipwrights, thoroughly skilled in wood-working, can by training, and in combination with a sufficient number of skilled workers in iron, be converted into good iron-workers themselves. But the fact remains, that with large numbers of workmen trained to the old business, and almost none who had any experience in the new, it required more than usual persistence and boldness to undertake the conversion of a fleet from wooden sailing vessels into iron steamers.

But this was not the worst of the situation. The change in the character of merchant ships worked wholly for the benefit of our great commercial competitor. As we had had an advantage in the early part of the century in the comparative cheapness and abundance of the materials needed for the kind of shipbuilding then prevailing, so in the latter half of the century England has had the advantage of us in the superior cheapness and abundance

of the materials required in the new art. So far as we knew, we had neither cheap iron nor suitable coal for working it. We had not the shops or the mechanics by means of which the ships of the future could be built. Finally, we had an immense number of shipwrights whose business was the production of wooden vessels, and whom no one would undertake to train in the art of building vessels of iron.

It may seem strange that in view of its probable future wooden shipbuilding should have gone on to the extent disclosed by the figures in the ten years between 1847 and 1857. During those years the average annual output of American shipyards was four hundred thousand tons. It is because of this distinguishing characteristic that we have called it the period of overproduction. The cause of this overproduction is to be found in certain exceptional circumstances, already alluded to, which created an urgent, but in some respects, only a temporary demand. The discovery of gold in California in 1849 immediately directed thither a vast stream of population, not only by the overland route, but by way of the Isthmus in the Pacific Mail steamers, and by sailing vessels around the Horn. The Pacific coast instantly became a center of population, of production, and of commercial activity. All this required ships, and American ships obtained the lion's share of the new business. From 1854 to 1856, again, the existence of the war in Europe, involving three of the principal powers, tended to create an artificial demand for the services of American vessels. The period also was characterized by a marvelous commercial development all over the world. Our import and export trade advanced in these years at an average rate of over fifty millions of dollars per annum, some years going far beyond that figure, as in 1851, when the increase was eighty-two millions, and in 1856, when it was one hundred and fifteen millions. Under such circumstances it is not surprising that the business classes connected directly or indirectly with foreign trade, above all the shipowners and shipbuilders, should have looked forward to an era of uninterrupted prosperity.

Eighth Period, 1859–1861. Culmination of Shipbuilding Tonnage. Waning Trade. Average per cent, 66.

The period now under consideration might really be said to be a part of that immediately preceding it. As it showed, however, a uniform proportion of American shipping in the American carrying trade, and as this proportion was a decided reduction

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1859....	2,321,674	$292,902,051	$331,333,341	$624,235,392	63.7	69.9	66·9
1860....	2,379,396	333,576,057	353,616,119	687,192,176	63.0	69.7	66·5
1861....	2,496,894	219,553,833	289,310,542	508,864,375	60.0	72.1	65·2

on the average of the preceding period, it is stated separately, in order to point out more clearly the downward tendency then in operation. The percentage was sixty-six as against seventy-two. Commerce still showed great activity, and tonnage continued to increase, until, in the year 1861, it reached the highest figure known in our history, 2,496,000 tons. We know now, as we look back upon the succession of events, that this high figure, the highest ever reached, represented a fictitious prosperity, and that it was merely the extreme point attained by the overproduction which had been going on without interruption during the preceding years. Most, though not all, of the causes operating at that time were still active, but the conditions were becoming more and more hopeless, in the attempt, by turning out model sailing ships, to compete with a community which had already, in great part, converted its tonnage into iron steamers. It had taken a long time to bring about the change, but the change had come. In 1850 the share of ocean freight carried by steamers was only fourteen per cent; in 1860 it had risen to twenty-eight per cent. Although, according to Lindsay's computation, the United States in 1860 owned a larger amount of tonnage, including lake and river steamers, than the United Kingdom, or nearly as much as Great Britain and all her colonial possessions combined, it was, as far as the foreign trade was concerned, a failing business. The higher tonnage was an evil, and not a blessing, and the glories of American ocean traffic, although few recognized it, were soon to be a thing of the past.

The clearest evidence of overproduction lies in the fact that in the year 1858 shipbuilding, which, as already stated, had been maintained at an average of 400,000 tons a year during the preceding ten years, suddenly dropped to 244,000, and in 1859 to 156,000 tons. Such a marked reaction, which must have thrown many shipwrights out of employment, could only be accounted for by overproduction. Another significant fact is to be noted in the sales of vessels to foreigners, which up to the year 1854 had averaged

ten thousand tons per annum. During the years from 1854 to 1859 inclusive they averaged nearly fifty thousand tons per annum.

Ninth Period, 1862–1865. The Civil War. Average per cent, 37.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1862....	2,173,537	$190,670,501	$189,356,677	$380,027,178	44.8	54.5	50.0
1863....	1,926,886	203,964,447	243,335,815	447,300,262	43.3	40.0	41.4
1864....	1,486,749	158,837,988	316,447,283	475,285,271	24.6	30.0	27.5
1865....	1,518,350	166,029,303	238,745,580	404,774,883	29.9	26.1	27.7

Notwithstanding the steadiness of the downward tendency which had been slowly manifesting itself since 1830, it is possible that this tendency might have been arrested, or at least have proceeded with equal slowness, in the thirty years following, had not the civil war intervened. Had the movement only continued with the same deliberateness as during the previous period, we should now be carrying forty-two per cent of our exports and imports, instead of thirteen per cent; and there is little doubt that during this time a readjustment of the business of shipowning and of shipbuilding would have taken place, which would, in part at least, have corrected the evils of the situation of 1860.

But the war struck a blow at the American merchant marine so rude and so unforeseen as to produce in the shipping interests a condition almost of paralysis. It of course cut off at once the whole carrying trade not only of Southern ports but of Southern products. But this was by no means its worst or most lasting injury to American commerce. Although the Confederates had no navy, and were in no position at any time to wage a naval war, yet by procuring cruisers from England of the most efficient type then known, they were able to prosecute an attack upon the merchant fleet of the Union more vigorous and more destructive in its results than had been carried on by any nation in any previous war. Nor was there any possibility of returning this attack. In the Revolution and in the War of 1812, as has been already remarked, our merchant marine, although cut off from the ordinary pursuits of commerce, was able to carry on with great profit the business of privateering as a partial compensation; and an additional compensation lay in the fact that to this distinct element of profit was added an equally distinct loss to its commercial rivals, with whom the nation was then at war. In the war of the re-

bellion our enemies had no commerce that we could attack, and we fitted out no privateers; consequently both the profit to ourselves and the losses to our rivals, which had distinguished the earlier wars, which had kept alive maritime activity, and which, as it were, had tided over the period of interrupted trade, were alike wanting.

The figures that characterize this period may be briefly noted. Although commerce decreased in 1862, it presently rose again, and, before the war ended, reached a fairly high point.

The loss in registered tonnage was about nine hundred thousand tons—a sudden fall from the high-water mark of 1861—the decrease being about thirty-eight per cent in four years. The loss was distributed as follows:

	Tons.
By sales abroad, 1862	114,939
" " 1863	217,126
" " 1864	291,383
" " 1865	128,197
Total sales	751,595
Captured by Confederate cruisers	110,000
Average loss, from casualty, say four per cent	40,000
Total loss	901,595

In estimating the significance of these losses, it is fair to say that, as far as the sales were concerned, they were partly due to the overproduction of the preceding ten years, and also that they consisted in part of vessels of a type that was destined in a few years to pass out of use. Nevertheless, the extraordinary figure of the total tonnage sold, which distinguishes these four years, shows that by far the largest part of the selling movement was owing to the sudden stress of the war, and to a prospect little short of impending ruin, due to this immediate cause, that compelled the shipowners to unload their property as rapidly as possible. The sales were forced sales, and they were made at great pecuniary sacrifice. There was no natural demand that made a sudden call throughout the rest of the world during the years from 1862 to 1865 for seven hundred and fifty thousand tons of American shipping, and those writers who undertake to show that this great transfer of tonnage was really a relief to the interests involved, willfully ignore the conditions of financial hardship under which it was accomplished. The total amount of tonnage captured—viz., one hundred and ten thousand tons—was far less than the amount of tonnage sold, and seems in comparison a small quantity. The direct losses that it involved were subsequently

made up to the owners, but the immediate effect upon the commercial community of these captures, representing two hundred vessels more or less, is not to be measured by the actual value of the vessels and their cargoes. As the news is reported day after day of the capture, let us say of one vessel a week, during two whole years, the effect upon a commercial community, and especially upon a business as sensitive as shipowning, is neither more nor less than absolute panic, and a panic resulting not from a single crisis, but from shock after shock, repeated with deadly effect over a protracted period. When we consider the various manifestations by which such shocks ramify and make themselves felt throughout a commercial community in the rates of marine insurance, in the aversion to maritime enterprise, and in the withdrawal of business by shippers, the wonder is not that a merchant marine should diminish in prosperity, but that it should ever be able to recover from such continued and stunning blows.

The loss in the proportion of carriage of American freights was thirty-eight per cent, the fall being from sixty-six per cent in 1861 to twenty-eight per cent in 1865. The situation at the close, therefore, showed a nation which had carried ninety per cent of its own exports and imports during the early period of its history, and which had fallen in the course of thirty years to eighty-three, seventy-two, and sixty-six per cent, now reduced in the course of four years to twenty-eight per cent, and seeing nearly three fourths of its merchandise carried by foreigners.

In connection with this subject it is a fact that can not be passed over, that the disastrous influence of the war on our mercantile marine was wholly due to the action of our only important commercial rival, whose professed relations with us at the time were those of peace and amity. Now we do not pretend to say, nor do we believe, that British commercial enterprise is in the nature of a conspiracy, or that supplies of "British gold," surreptitiously used, have any influence or control over the commercial destinies of America. It is admitted that in a business competition our competitors are free to get the better of us if they can, and it is for us to do everything in our power to get the better of them if we can. Yet the simple fact remains, that at the outbreak of the war we had but one commercial rival, and that we had up to that time a great and prosperous commerce; that the illegal acts of this rival in the fitting out or permitting the fitting out of cruisers in his own ports, to prey upon our commerce, in violation of his friendly professions, in defiance of law, and in the

face of the most specific and earnest protest made in ample time to prevent the acts in question, resulted in the capture and destruction of over one hundred thousand tons of our shipping, in the sale, consequent upon these captures, of three quarters of a million more, and in the almost total extinction of our foreign commerce, to his own great advantage and benefit; and, finally, that the price which was paid by this rival for his unfriendly and illegal acts—namely, $15,500,000, of the Geneva award—was a ridiculously cheap price to pay for the benefits directly resulting to him from these acts. That a commercial state should use every legitimate means to extend its commerce, that it should endeavor to crowd out its rivals, that it should seize every possible advantage, is to be expected. That it should in an open war try to crush its enemy's commerce, is reasonable. But that it should take advantage, when at peace with its rival, of a condition of feebleness brought about by the strain of a civil war, to perform covertly illegal acts of hostility, whereby a great national industry is ruined, is a matter for which the payment of a few million dollars of indemnity is no compensation. Whatever may be said of British policy in reference to protection and subsidy, no other nation ever gave such protection to its shipyards as that afforded by the Government of Great Britain during our civil war, or subsidies having such far-reaching results as the indemnity which it was obliged to pay by reason of its having afforded this protection. It protected British shipbuilders in the building of vessels fitted for war cruisers, and it protected shipowners by allowing the vessels so built to escape from its jurisdiction and exterminate our commerce. The mere capture of one hundred thousand tons of shipping is in itself no great matter. Even the sale of seven hundred and fifty thousand tons in four years is not an irreparable disaster; but the loss by interruption of commerce, by the advance in insurance premiums, by general alarm and panic, and, above and beyond all, by the diversion of trade into new channels, which the wrong-doer himself was ready to occupy, and, having once acquired, to retain in possession, can not be estimated in dollars and cents.

Tenth Period, 1866–1871. Reaction. Average per cent, 34.

During this period, as might be expected, commerce showed an immense increase, the natural rebound after the decline during the war. Tonnage held its own, for a time increasing, and remained at the end almost the same that it had been at the be-

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined exports and imports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1866....	1,387,756	$348,859,522	$434,812,066	$783,671,588	25.1	37.7	32.2
1867....	1,515,648	294,506,141	395,761,096	690,267,237	28.0	39.1	33.9
1868....	1,494,389	281,952,899	357,436,440	639,389,339	33.0	36.6	35.1
1869....	1,496,220	286,117,697	417,506,379	703,624,076	31.3	34.9	33.1
1870....	1,448,846	392,771,768	435,958,408	828,730,176	33.1	37.7	35.6
1871....	1,363,652	442,820,178	520,223,684	963,043,862	31.0	32.6	31.8

ginning. The percentage of American carriage in the foreign trade increased from the lowest figures of the war—twenty-eight per cent—but the increase was slight and unimportant, the effect of mere reaction. In 1868 and 1870 it rose as high as thirty-five per cent, but the average was thirty-four, as against sixty-six in the last year of the *ante-bellum* period. Legislation, so far from ameliorating the situation, only made it more burdensome and discouraging. The act of February 10, 1866, prevented the return to our registry of vessels which had passed during the war under a foreign flag. Perhaps we had lost so much of the carrying trade that they would have found only a restricted employment; but however that might be, the law was an obstruction to the re-establishment of business in its previous channels. The continuance after the war of the internal revenue tax of two per cent on the hulls of vessels built, and of three per cent on marine engines (the latter increased to five per cent by the act of March 3, 1865), neither of which was repealed until March 31, 1868, was another fatal mistake. In fact, the domestic production of nearly every form of material or article used in shipbuilding, including masts, spars, paints, sails, pig-iron, manufactured iron, castings, steel, rivets, copper, and lead, was taxed under the comprehensive internal revenue acts adopted to provide for the necessities of the Government during a crisis. It is no wonder, under these circumstances, that there was no revival of shipbuilding, and no immediate recovery in the shipping business, such as had been seen at the close of the earlier wars.

An act of Congress of February 16, 1865, authorized the establishment of an ocean mail service between San Francisco and China and Japan. Under the provisions of this act a mail contract was entered into with the Pacific Mail Steamship Company, by which it received an annual compensation of five hundred thousand dollars for carrying the mails. The new line was started

in 1867, with four four-thousand-ton steamers, luxurious in their internal arrangements, but built of wood, with paddle-wheels and walking-beam engines. In 1850 they would have been fine ships; in 1867 they were obsolete. All of them have long since disappeared. No better illustration could be given of the fatal conservatism of American shipping interests than the policy pursued in this period subsequent to the war of our greatest American steam navigation company.

The distressing character of the civil war so close to our doors, and its complete absorption for the time of the energies of the whole people, caused a sort of torpor, the result of physical exhaustion, to settle upon the country during the first years immediately following it. But a reaction soon set in, and commercial and manufacturing enterprise began to renew its activity. The volume of imports and exports increased with surprising rapidity. Toward the close of this period the internal development of the country, especially in the matter of railroads, took enormous strides and began to absorb vast amounts of capital. In the years 1870 and 1871 there was an increase of fourteen thousand in the mileage of roads operated. It might have been expected that the carrying trade would advance along with other industrial interests, but, as a matter of fact, the discouragement caused by the war, following upon the misdirected efforts of the previous ten years, had given shipowners an experience which acted as a powerful deterrent from further enterprise in this field. The shipbuilders were not yet in a condition to furnish an American merchant fleet of modern type; the shipowners were not in a condition to employ it. When trade has fixed itself in new channels it is not easy to restore it to the old, and it was doubly difficult when the occupant of the new field possessed such overwhelming advantages in the building of ships. To these facts must be added another, perhaps the most important, that the internal development of the country offered employment for capital far more promising and more attractive, and far less open to competition, than merchant shipping. Agriculture, manufactures, the development of cities, and land transportation, as competitors in the employment of capital, completed the work which had been begun by the shipowners of Great Britain as competitors in the earning of freight. The two influences combined were all-sufficient to account for our failure to recover our proportion of the carrying trade during the twenty years following the war.

During this period the condition and prospects of the mercan-

tile marine received much attention, and were the subject of extended comment both in the press and in Congress, but without leading to any definite result. The Lynch report, so called from its author, the chairman of the Committee on Commerce in the House of Representatives, was submitted to the House February 17, 1870. It contained an exhaustive review of the subject, and advocated the passage of a bill remitting duties on importations of shipbuilding material and of ships' stores. It also recommended a bounty to sailing and steam vessels engaging during six months of the year in the foreign trade. The report was widely discussed, but the bill failed to pass.

The American Steamship Company of Philadelphia was organized in 1871, for the establishment of a freight and passenger line between Philadelphia and Liverpool. Four vessels were built by Cramp for this line—the Pennsylvania, Ohio, Indiana, and Illinois. They are iron screw steamers of about thirty-two hundred tons, of excellent construction, and are still running. The pioneer of the line—the Pennsylvania—was launched in August, 1872, and made her first voyage in May, 1873. During the last twenty years the American Steamship Company stands out among the immense fleets of transatlantic traffic as the only important line sailing under the American flag. It passed ultimately into the hands of the International Navigation Company, an American corporation, which also controlled the Inman Line between New York and Liverpool, and the Red Star Line between New York and Antwerp. Under the direction of its able president, Mr. Clement A. Griscom, the foremost man to-day in the business of American shipping, this company bids fair to lead the way in the restoration of the merchant marine.

Eleventh Period, 1872–1879. Return to War Figures. Average per cent, 27.

In this period a steady decrease in imports, with an equally steady and marked increase in exports, kept the total of commercial exchanges at a nearly uniform figure of about eleven hundred millions per annum. Tonnage remained stationary, but the carrying trade was passing away from our hands. The utmost effect of the reaction from the war had spent itself. Thirty-five per cent was the highest point attained through this influence. In the seventies we went back to a point even lower than that reached in 1865, and our proportion of the carrying trade was reduced to twenty-seven per cent. In this period the Pacific Mail contract was discontinued.

A New York pilot boarding a steamship in a gale.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1872..	1,359,040	$444,177,586	$626,595,077	$1,070,772,663	26.8	29.8	29.1
1873..	1,378,533	522,479,922	642,136,210	1,164,616,132	27.0	25.7	26.4
1874..	1,389,815	586,283,040	567,406,342	1,153,689,382	30.2	24.6	27.2
1875..	1,515,598	513,442,711	533,005,436	1,046,448,147	29.2	23.7	26.2
1876..	1,553,705	540,384,671	460,741,190	1,001,125,861	30.8	25.4	27.7
1877..	1,570,600	602,475,220	451,323,126	1,053,798,346	31.5	23.7	26.9
1878..	1,589,348	694,865,766	437,051,532	1,131,917,298	32.2	22.6	26.3
1879..	1,451,505	710,439,441	445,777,775	1,156,217,216	32.6	17.6	23.0

What the general falling off had been may be illustrated by the following figures: In the year ending September 30, 1822, the American vessels entering the port of New York registered 217,000 tons, the foreign vessels 22,000 tons. In the year ending June 30, 1874, the entrances of American vessels at New York were 1,124,000 tons, and of foreign vessels 3,925,000 tons. In 1850, 1,600,000 tons of American shipping entered at ports of the United States, and 1,300,000 tons of foreign shipping; in 1860, 3,300,000 tons of American to 1,700,000 of foreign; while in 1871 the proportion was 2,600,000 American and 4,300,000 foreign.

The general discussion of remedial measures continued. In 1872 the Secretary of the Treasury, Mr. Boutwell, submitted a plan to the Committee on Commerce of the House of Representatives, embodying a scheme for a bounty on the construction of iron vessels to be employed in foreign commerce. The experiment was to be tried for five years. The plan, however, came to nothing.

In the same year, the act of June 6, 1872, provided for the entry duty free of material imported for use in wooden shipbuilding. The value of materials admitted under this act has been about seventy thousand dollars annually.

Twelfth Period, 1880–1890. Further Decline. Average per cent, 16.

Of this period there is little to be said. Commerce took a new start in 1880, and the aggregate of exports and imports has risen in twelve years from eleven hundred millions to seventeen hundred millions. The American carrying trade has experienced a further decline, the proportion finally falling to thirteen per cent instead of twenty-seven in the previous period. American carriers retain a larger share of the import than of the export trade, but both are so low that the difference hardly seems material.

Year.	Registered for foreign trade.	Exports.	Imports.	Total exports and imports.	Proportion of American carriage in foreign trade.		
					Imports.	Exports.	Combined imports and exports.
	Tons.				*Per ct.*	*Per ct.*	*Per ct.*
1880..	1,314,402	$835,638,658	$667,954,746	$1,503,593,404	22.00	13.07	17.6
1881..	1,297,035	902,377,346	642,664,628	1,545,041,974	19.90	13.30	16.2
1882..	1,259,492	750,542,257	724,639,574	1,475,181,831	19.20	12.80	16.0
1883..	1,269,681	823,839,402	723,180,914	1,547,020,316	20.70	13.40	17.0
1884..	1,276,972	740,513,609	667,697,693	1,408,211,302	22.40	14.40	18.4
1885..	1,262,814	742,189,755	577,527,329	1,319,717,084	21.30	13.70	17.0
1886..	1,088,041	679,524,830	635,436,136	1,314,960,966	20.00	13.60	16.8
1887..	989,412	716,183,211	692,319,768	1,408,502,979	18.60	12.20	15.4
1888..	919,302	695,954,507	723,957,114	1,419,911,621	18.50	11.70	15.1
1889..	999,619	742,401,375	745,131,652	1,487,533,027	17.08	11.62	14.3
1890..	928,062	857,828,684	789,310,409	1,647,139,093	16.60	9.03	12.8

Even the tonnage in the foreign trade has fallen below one million for the first time since 1846. The year 1891 showed a slight improvement in tonnage, the figure for that year being 988,719 tons, as against 928,062 tons in 1890; but a part of this gain has since been lost, the amount for 1892 being 977,624 tons.

The legislation of this period included the act of June 16, 1884, providing that imported merchandise needed as supplies for merchant vessels of the United States might be withdrawn from warehouse free of duty. Under this act, goods amounting in value to about sixty-five hundred dollars are annually withdrawn.

Toward the close of the period came a much more important piece of legislation—the Postal Contract Act of March 3, 1891. This will be considered at length in a later place. A bill providing for bounties on building and on navigation, introduced and urged during the same session, failed to become a law.

One of the noticeable features of this period, and one calling for the adoption of a strong national policy, is the condition of our Pacific trade, under the effects of recent Canadian competition. The early history of our Pacific trade was encouraging. It received its first impulse from the gold discoveries and the rush of immigration in 1848. The following year witnessed the firm establishment of steam navigation between New York and San Francisco by way of the Isthmus. This navigation was essentially a branch of the coasting trade, and was so declared under the law. It was therefore protected from foreign competition, and this fact has preserved it to the present time.

The Pacific Mail, which held this trade, extended its operations in 1867 to foreign commerce, by the establishment of a line

from San Francisco to China. The advantages secured by this combination enabled it to operate the new line with success.

A somewhat similar combination has enabled the Oriental and Occidental Steamship Company to maintain a line between San Francisco and China. This company, by its alliance with the Southern Pacific Railway, connecting San Francisco and New Orleans, and with the Morgan line of steamers from New Orleans to New York, with other closely connected or allied interests, including the Southern Development Company, the Pacific Improvement Company, etc., has placed itself in a favorable position to command such of the trans-Pacific trade as it is adapted to handle. Without such relations with transcontinental or coastwise commerce the foreign trade of these San Francisco lines would have experienced serious difficulty in holding its own against outside competition.

The same policy has now been adopted by the Canadian interests finding their Pacific outlet at Victoria, and the active co-operation of the Canadian Government has placed these interests in a position from which they can menace our whole commerce on the West coast. This co-operation has taken the form of work of construction, land grants, guarantees, exemptions, and exclusive privileges, the whole estimated in value at over two hundred million dollars. With the railway is connected the line of fine steamers recently built, and running from British Columbia to China. The three great steamers of this line—the Empress of China, Empress of India, and Empress of Japan—are among the best vessels of their type afloat to-day, and they are specially adapted for conversion into efficient cruisers. They receive large mail subsidies, and in addition the bounty paid by the British Government for an option, in case of war, to the owners of certain exceptionally fast steamers—a form of Government assistance which will be more fully referred to later.

Connected with this vast scheme of commercial development is a corresponding plan of development of British naval power in the Pacific. It was remarked by a British officer of rank, a keen observer, in a discussion at the Royal United Service Institution nearly twenty years ago, that "some day or other there will be a desperate struggle between three or four nations for the commerce of the Pacific, and the one which has developed most successfully its maritime strength in that quarter will carry off the prize." Without assenting entirely to the strategic view of the question, its importance as a factor can not be neglected;

and the establishment and strengthening of the great naval depot at Esquimalt, the steady extension of outposts in the islands of the Pacific, and the employment on subsidized lines of what are in point of fact naval cruisers of a high degree of efficiency, must be taken into consideration as important features in the British scheme of commercial and naval aggrandizement in the Pacific. The territorial expansion which forms a part of this scheme is held in check at two points, Samoa and Honolulu; and it will be an evil day for American interests in the Pacific when our present advantage at these points is surrendered.

The naval side of this programme gives less present occasion for concern than the commercial side. There is little doubt that the financial advantages possessed by the Canadian Pacific combination will make competition a hopeless task unless some remedy for the situation is devised; and in any case a large part of the trade of San Francisco and its trans-Pacific lines will be transferred to British Columbia.

It would be well, in commenting upon this period, which closes the first century of American history, to compare briefly our conditions with those existing at the foundation of the Government. The population numbered 3,890,000 in 1790, as against 62,000,000 in 1890. The aggregate value of imported and exported merchandise in 1790 was $48,212,041, as compared to $1,647,139,093 in 1890. In 1789 the registered tonnage in the foreign trade amounted to 123,893 tons; in 1890 it was 928,062, but it had risen in the intermediate period to 2,494,894 (1861). In 1790 the value of commerce per capita was $12.40; in 1890 it was $26. In 1798 the number of vessels built in the United States was 635, with an aggregate tonnage of 49,435, being an average of 77.85 tons per vessel; in 1890 the number of vessels built was 1,051, with an aggregate tonnage of 294,122, being an average of 279.8 tons per vessel; but in one year of the intermediate period (1855) there were built 2,027 vessels, with an aggregate tonnage of 583,450, the highest tonnage ever reached in any one year. In the year 1812, the first in which the records are complete, there were built four steam vessels, with an aggregate tonnage of 457, or 114.25 tons to the vessel; in 1890 there were built 410 steam vessels, with an aggregate tonnage of 159,045, or 387.9 tons to the vessel. In 1823, out of a total tonnage of 1,336,566, 24,879 tons, or 1.8 per cent, were of steam vessels; in 1890, out of a total of 4,424,497, 1,859,088 tons, or 42 per cent, were of steam vessels. In 1789 the total ton-

nage of vessels in the United States was 201,562; in 1891 it was 4,684,759, of which 2,780,683 tons were on the Atlantic and Gulf coasts, 440,857 on the Pacific, 1,154,870 on the Great Lakes, and 308,347 on the Western rivers. In 1869, from which date the records of the Treasury Department as to iron vessels begin, there were built 4,584 tons of iron sailing ships and steamers out of a total tonnage built of 275,230, or 1.6 per cent; in 1890 there were built 80,378 tons of iron and steel vessels out of a total tonnage built of 294,122, or 27 per cent. In 1789 the proportion of imports and exports carried in American vessels was 23.7 per cent; in 1890 it was 13 per cent, but it had in the meantime (in 1796, and again in 1807, 1810, 1825, and 1826) risen to 92 per cent.

Coastwise Trade.

The coastwise trade of the United States, having been exempted from foreign competition, has a history quite different from that of the foreign trade. When the tonnage duties were adopted in 1789, as stated above, in the third act of the First Congress, it was provided that American coasting vessels should pay the duty only once a year, and that foreign vessels, which it was not thought expedient to exclude wholly at this time from the coasting trade, should pay their advanced duty at each entry. Subsequent acts adopted from time to time, with reference to registration and enrollment, placed additional obstacles in the way of the employment of foreign vessels in coastwise traffic, and the act of April 5, 1808, which was one of the supplements to the Embargo Act, excluded them altogether. In the following year, however, the coasting trade was in a measure set free. It was finally closed altogether to foreign vessels by the act of March 1, 1817 (the American Navigation Act).

In consequence of this absence of competition we find that the coasting trade has shown an increase of tonnage almost without a break from 1789, when it amounted to 68,607 tons, to 1892, when it amounted to 3,700,773 tons, and that this is the highest figure which it has ever attained. Its tonnage advanced up to 1860, the culminating point of our registered tonnage, with remarkable steadiness, and the figures of the two branches of trade were at this date not far apart, the tonnage registered for the foreign trade being 2,496,894, and that enrolled and licensed for the coasting trade being 2,764,544. During these seventy years there had been great fluctuations in the registered tonnage, which it will be remembered culminated in 1810 with a

total of 981,000 tons, and after a long period of depression finally reached an equally high figure in 1847. The coastwise trade, on the other hand, though it showed occasional fluctuations, suffered no important decrease except in the period of overproduction following the year 1828, and from this it rapidly recovered. Since 1860 its growth has been equally steady and uninterrupted; and while the registered tonnage in the foreign trade has decreased from 2,500,000 tons in 1861 to 977,624 tons in 1892—hardly more than one third of the highest figure reached—the tonnage in the coastwise trade has gone on steadily increasing, until it has now (1892) reached 3,700,773 tons, an amount half as large again as that attained in 1861.

Of the total tonnage of the coastwise trade in 1892, the steam tonnage is 1,821,996 tons, or forty-nine per cent; whereas, of the tonnage registered for the foreign trade, the steam tonnage is only 225,437 tons, or about twenty-three per cent. It therefore appears that the coasting trade is on a much more modern and progressive footing than what is left to us of the foreign trade.

Among the flourishing seagoing coastwise lines at present in existence may be mentioned the Boston and Philadelphia Steamship Company, with a fleet of seven ships; the Clyde Line, between New York and Southern ports, and also to Hayti and Santo Domingo, with fourteen ships; the Cromwell Line, between New York and New Orleans, with four ships; the Mallory Line, between New York and the Gulf ports, with eleven ships; the Merchants' and Miners' Transportation Company, between Boston and Baltimore, with nine ships; the Metropolitan Steamship Company, between New York and Boston, with six ships; the Morgan Line and its various branches, with twenty-five ships, some of them of the best and most recent construction; the Ocean Steamship Company, between New York and Savannah, with six ships; and the Old Dominion Steamship Company, between New York and Richmond, with nine ships. On the Pacific coast are the Oregon Improvement Company, the Oregon Railway and Navigation Company, and the Pacific Coast Steamship Company, the last with fourteen ships, and other lines of less importance well equipped with modern steamers. The Pacific Mail Company with its great fleet, as far as its Isthmus of Panama service is concerned, is, in point of fact, a coasting line between New York and San Francisco.

One of the most important branches of our coastwise commerce is the lake trade. The commerce of the Great Lakes is

carried on under conditions entirely different from those which surround ocean navigation. Apart from the local traffic, which is considerable, navigation on the lakes is chiefly engaged in operations subsidiary to railroad transportation. Very little of it finds its way into the ocean. The Welland Canal, connecting Lake Erie and Lake Ontario, has a depth of fourteen feet. There were, in 1889, three hundred and thirty vessels belonging to United States ports in Lakes Superior, Michigan, Huron, and Erie, aggregating 450,000 tons, whose draft when loaded exceeded this depth. This was about two fifths of the entire lake tonnage.

As to the system of canals passing the rapids of the St. Lawrence, by which alone egress can be obtained from Lake Ontario, they were originally designed for a depth of nine feet, and the water falls at times to less than seven. In 1871 it was decided to increase the depth to twelve feet, and later to fourteen feet, but the work has not yet been completed, and possibly never will be. The employment of lake shipping is therefore either local in its character, or represents only one stage in the mixed land and water transportation of the products of Canada and the Northwest.

It can not be said that our lake traffic is without competition, but it is a competition which United States vessels pursue under favorable circumstances. On the southern shore of the lakes—in fact, on all shores of Lake Michigan, which is an inland sea in United States territory—are to be found a great number of large and growing cities, centers not only of population but of railway transportation, which form the commercial emporiums of a thickly settled and prosperous country. The principal American lake ports, Duluth, Escanaba, Ashland, Marquette, Milwaukee, Chicago, Ludington, Detroit, Toledo, Sandusky, Ashtabula, Cleveland, Erie, Buffalo, Oswego, and Ogdensburg, are great and flourishing cities, at the head of which stands Chicago, with a population of 1,100,000, and at the center of the greatest railway system in the world. Its total trade for 1890 was estimated at $1,440,000,000. It is the seat of a great manufacturing industry as well as of commerce, and the country surrounding it for miles in the interior is the granary not only of the Western but in large part also of the Eastern hemisphere.

On the Canadian shore of the lakes also lies a vast territory, which will doubtless some day contain a teeming population, and export an immense quantity of agricultural products, but it is as yet undeveloped, and its ports are unimportant as compared with

those on the United States side of the water. The principal points are Toronto, Hamilton, Coburg, and Kingston, all of them on Lake Ontario. Of these, Toronto is a considerable and growing place, the center of commercial and political movement in the province of Ontario, and has a population of 160,000. Compared with Chicago it is a small town, and, although it has doubtless a great future, it has not yet reached a point where it may attempt to rival even the secondary cities on the opposite shore.

The commerce of the lake ports is simple in its character. Nine tenths of it is comprised of flour, grain, coal, lumber, and iron ore. The extent of the traffic movement may be gathered from the fact that the total entrances and clearances in 1890 for United States ports in the lakes were 88,000, of which 21,000 were for Chicago alone. The corresponding total for New York during the same year was 15,000, and for all the seaports of the United States less than 38,000. The tonnage of vessels annually built has increased during the last ten years from 58,369 to 111,856. The lake tonnage of the United States has increased during the same period from 711,270 in 1882 to 1,183,582 in 1892, or one fourth of the whole United States tonnage, and the increase has been a steady growth without a break. Compared with this the Canadian tonnage at the present time on the lakes, amounting to 172,971, is an insignificant figure. The new vessels added to the United States tonnage during the four years from 1886 to 1890 alone were valued at over $27,000,000.

The marked superiority of the United States in the lake commerce is to be seen not only in the number but in the quality of vessels. The largest steamer is the Owego, owned by the Union Steamboat Company, having a length of three hundred and fifty-three feet and a breadth of forty-one feet two inches, with a displacement of 4,800 tons. This vessel, and her sister ship, the Chemung, of the same size, were built at Buffalo by the Union Dry Dock Company, and are similar in design to the Mallory steamers running from New York to the Gulf. These vessels are built of steel, have powerful triple expansion engines, and embody every feature of recent progress of marine architecture. In addition to the Union Steamboat Company, four other large lines ply regularly from Buffalo to ports on the upper lakes, having a combined fleet of sixty steamers, with a capacity ranging from 1,700 to 3,000 tons.

The increase in the size of our lake vessels is illustrated by the following table, showing the average registered tonnage of the

vessels passing during each of the last six years through the St. Mary's Falls Canal:

Year.	Average tonnage per vessel.
1887	626.3
1888	701.5
1889	790.5
1890	833.8
1891	862.1
1892	884.14

As is pointed out in the report of the present Commissioner of Navigation, Hon. E. C. O'Brien, from which the above figures are taken, the development of our lake commerce is largely due to the exclusion of foreign vessels from trade between American ports. The freight traffic of the St. Mary's Falls Canal for the season of 1892 exceeds 11,000,000 tons. The action of President Harrison in imposing tolls on vessels transporting merchandise to Canada through the canal, to offset the Welland Canal tolls imposed by Canada, was an act of sound public policy.

The last tables issued by the census office give the following port tonnage statement for the leading lake ports, showing receipts, shipments, and total tonnage for each port in excess of 600,000 tons:

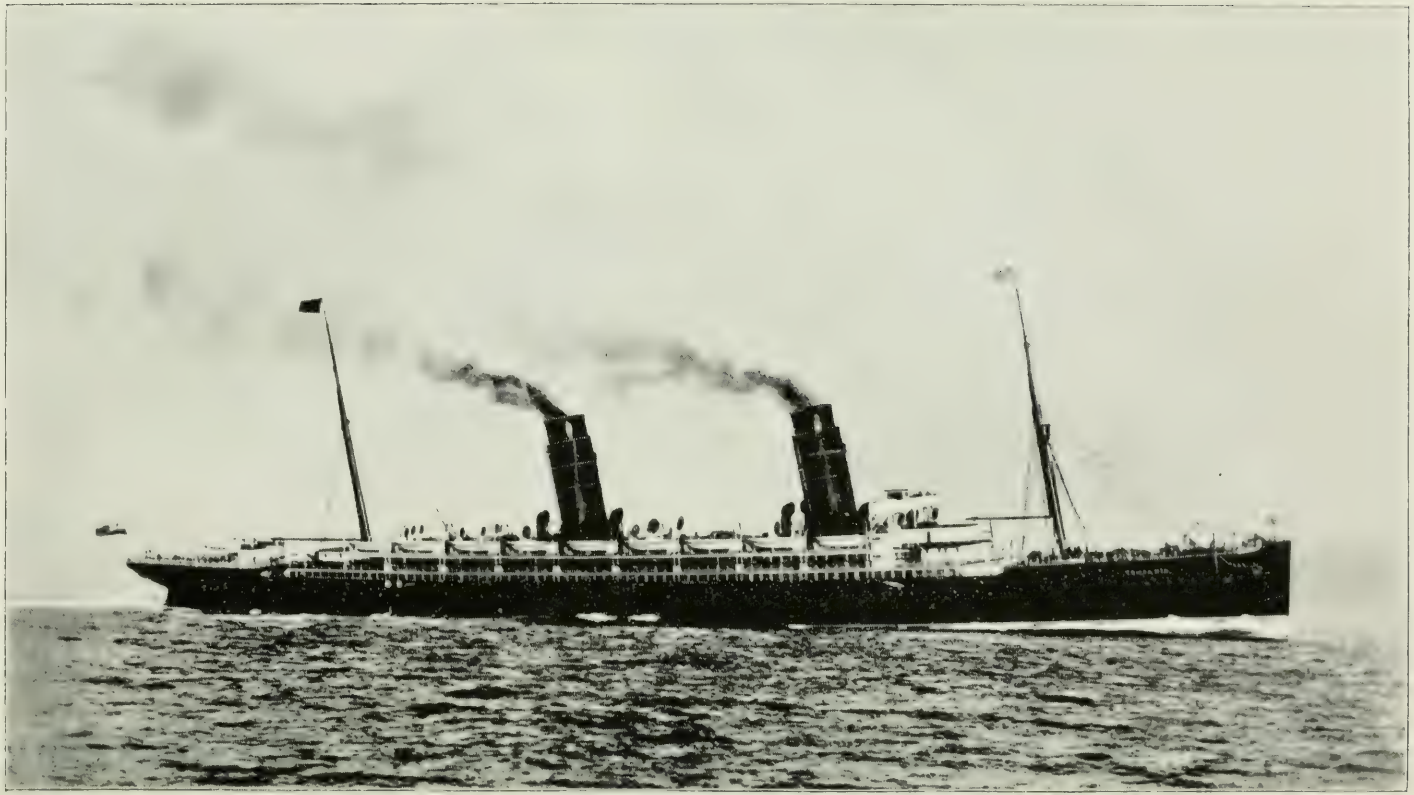
Port Tonnage Statement.

Ports.	Receipts.	Shipments.	Total tonnage.
Chicago	5,069,973	2,914,065	7,984,038
Buffalo	4,046,144	2,683,993	6,730,137
Escanaba	195,558	3,430,832	3,626,390
Cleveland	2,737,708	883,862	3,621,570
Ashtabula	2,205,595	489,585	2,695,180
Ashland	487,358	1,759,884	2,247,242
Milwaukee	1,584,254	351,554	1,935,808
Marquette	143,346	1,567,539	1,710,885
Toledo	506,351	930,640	1,436,991
Erie	773,030	498,958	1,271,988
Superior	875,692	304,605	1,180,297
Duluth	683,162	430,886	1,114,048
Tonawanda	1,046,895	.....	1,046,895
Muskegon	151,303	851,440	1,002,743
Fairport	939,021	59,438	998,459
Two Harbors	.....	936,541	936,541
Detroit	615,750	148,803	764,553
Oswego	402,847	288,271	691,118
Ogdensburg	470,044	192,860	662,904
Manistee	28,096	601,814	629,910
Ludington	276,229	351,398	627,627
Loraine	346,899	273,874	620,773
Sandusky	305,029	297,374	602,403
Total	25,936,132	25,266,974	51,203,106

Fisheries.

In the colonial period fisheries were an extensive, prosperous, and remunerative industry. The importance of encouraging them was recognized by the home Government, which paid a bounty of £20,000 per annum to American fishermen. At the outbreak of the Revolution the active sale of fish in the West Indies in exchange for rum and molasses ceased, the bounty was withdrawn, and for the time being the fisheries were almost annihilated.

It did not, however, take them long to revive. In 1790 the cod fishery employed four hundred and eighty vessels, aggregating 27,000 tons, and the amount of fish taken was 400,000 quintals per annum. The interests of the fishermen were carefully looked after by the Government. No tonnage duty was exacted of fishing vessels, and a bounty was provided by law to replace that of the pre-Revolutionary period. The rights of fishermen on the coasts of the British North American provinces were the subject of endless negotiations and of repeated treaty stipulations. The period of highest development in American fisheries was from 1836 to 1862 for the whale fishery, and from 1852 to 1864 for the cod and mackerel fishery. The former, in 1858, boasted a registered tonnage of 198,594 tons. Since that time it has shown a steady decrease. It received its first severe blow during the war from the depredations of the Confederate cruisers, especially the Shenandoah, in Bering Sea, in 1865. Subsequently the new uses and applications of petroleum still further reduced its operations, until it has now fallen to 17,231 tons. The seventy-one vessels representing this tonnage are distributed between seven ports in the United States—Boston, Barnstable, Edgartown, and New Bedford, in Massachusetts; Stonington and New London, in Connecticut; and San Francisco. Of these, New Bedford takes the lead, with a total tonnage of 12,550; and San Francisco is second, with a total of 3,021 tons. Of the New Bedford tonnage, however, only 902 tons are steam vessels, whereas the whole amount credited to San Francisco is steam tonnage. The products of the whale fisheries amounted, in 1890, to $895,901; in 1891, to $952,990. Of the two principal rivals in this trade, the New Bedford product has decreased in productive value from $325,752 in 1890 to $264,977 in 1891, while the San Francisco product has increased in the same period from $470,036 in 1890 to $571,509 in 1891. These figures go to show that the seat of the whale fishery is being



Steamship Campania.

gradually transferred from the Atlantic to the Pacific coast. The opening of railroad communication has made it cheaper to land cargoes from whalers at San Francisco and ship them by rail over the country than to take the long voyage by way of Cape Horn.

The cod and mackerel fishery reached its highest point in 1862, when the tonnage thus employed was 231,597 tons. Since that period it has shown a great decrease—not, however, by any means to the extent of the whale fishery. In 1891 there were employed in the cod and mackerel fishery fourteen hundred and eighty-three vessels, with a total tonnage of 68,933 tons. The vessels are distributed over a small number of States, comprising, in addition to the maritime States of New England, New York, New Jersey, Virginia, North Carolina, Florida, California, Oregon, and Alaska. Massachusetts heads the list, with seven hundred and twenty-six vessels, having a tonnage of 42,989; and Maine stands second, with three hundred and ninety-six vessels, having a tonnage of 11,688. These two comprise nearly five sixths of all the vessels so employed in the United States.

Taking all classes of ocean products which can be comprised under the designation of fisheries, including shellfish, it appears that there were employed in the coast fisheries of the United States, in 1888, 137,444 persons, employing vessels and boats to the value of $3,082,000, and a total of property of all kinds, including apparatus of capture, capital, shore property, etc., of $45,000,000. The value of the fisheries during the year under consideration, as stated by the Fish Commissioner, was $34,234,045. Among the States represented, Massachusetts heads the list with $6,000,000, California stands second, and New Jersey third.

GENERAL ACCOUNT OF EQUIPMENT AND OPERATION.

(From the census of 1890.)

TABLE I.—EQUIPMENT.

Number, Tonnage, and Value of all Steamers, Sailing Vessels, and Unrigged Craft registered in the Ports of the United States, December 31, 1889.

GEOGRAPHICAL DIVISIONS.	STEAM VESSELS.			SAILING VESSELS.		
	Number.	Long tons.	Value.	Number.	Long tons.	Value.
Atlantic coast.....	2,713	793,571	$70,593,090	6,490	1,383,108	$45,545,357
Gulf of Mexico.....	220	45,591	2,961,450	613	17,249	788,110
Pacific coast.....	531	170,503	15,526,455	822	208,080	6,715,570
Great Lakes.....	1,489	599,949	41,193,324	987	187,006	4,275,650
Mississippi Valley..	1,114	210,772	10,539,251	.....	.....	.....
Total.....	6,067	1,820,386	$140,813,570	8,912	1,795,443	$57,324,687

TABLE I.—*Continued.*

GEOGRAPHICAL DIVISIONS.	UNRIGGED.			TOTAL.		
	Number.	Long tons.	Value.	Number.	Long tons.	Value.
Atlantic coast.....	3,250	617,761	$7,735,730	12,453	2,794,440	$123,874,177
Gulf of Mexico.....	175	14,722	101,710	1,008	77,562	3,851,270
Pacific coast.....	489	63,356	825,345	1,842	441,939	23,067,370
Great Lakes.....	308	139,400	3,472,500	2,784	926,355	48,941,474
Mississippi Valley..	6,339	3,182,608	4,795,754	7,453	3,393,380	15,335,005
Total.....	10,561	4,017,847	$16,931,039	25,540	7,633,676	$215,069,296

TABLE II.—FREIGHT TRAFFIC.

Statement showing the Freight Movement in Tons by all Classes of United States Commercial Craft operating during the Year ended December 31, 1889.

GEOGRAPHICAL DIVISIONS.	By steamers.	By sailing vessels.	On unrigged craft.	Total all craft.
Atlantic coast.....	28,778,341	38,283,401	10,535,884	77,597,626
Gulf of Mexico.....	1,455,450	1,359,526	49,980	2,864,956
Pacific coast.....	5,741,940	2,761,826	314,597	8,818,363
Great Lakes.....	20,181,483	19,302,949	13,940,000	53,424,432
Mississippi Valley.....	10,345,504	.....	19,059,542	29,405,046
Total.....	66,502,718	61,707,702	43,900,003	172,110,423

TABLE III.—CREWS AND WAGES.

Statement showing the Total Number of Persons of all Classes employed to make up the Ordinary Crews of all Operating Vessels of the United States during the Year ended December 31, 1889.

GEOGRAPHICAL DIVISIONS.	STEAMERS AND UNRIGGED.		SAILING VESSELS.		TOTAL ALL CRAFT.	
	No. of employees.	Amount of wages paid.	No. of employees.	Amount of wages paid.	No. of employees.	Amount of wages paid.
Atlantic coast....	23,174	$10,358,426	31,685	$8,503,773	* 54,859	*$18,862,199
Gulf of Mexico...	2,479	880,743	1,412	335,001	* 3,891	* 1,215,744
Pacific coast.....	9,750	3,682,062	6,059	2,445,639	15,809	6,127,701
Great Lakes.....	18,095	6,519,891	5,909	1,854,188	24,004	8,374,079
Mississippi Valley.	15,996	5,338,862	.....	.....	15,996	5,338,862
Total.....	69,494	$26,779,984	45,065	$13,138,601	* 114,559	*$39,918,585

Having outlined briefly the history of American shipping, more particularly of the foreign trade, during its first century, it remains to examine the influences that are now operating upon its development.

It is necessary, in the first place, to distinguish between the three great forms of maritime industry; to compare them from the

* Exclusive of pleasure craft on the Atlantic coast and Gulf of Mexico.

point of view of national importance; and to notice in what respect they are antagonistic or interdependent, and how they are affected, beneficially or adversely, by surrounding conditions.

The three branches of maritime industry are commerce, or the movement of merchandise to a market, which is the business primarily of the merchant or shipper, though it concerns indirectly the producer and manufacturer; second, transportation, or, as it is commonly called, the carrying trade, which concerns the shipowner; third, construction, which is the business of the shipbuilder. Viewed narrowly, the interests of these three classes—the merchant, the shipowner, and the shipbuilder—are in many respects hostile; an increase of profits for one means a loss of profits for the other. The merchant wants low freights. The profits of the shipowner lie in high freights and in ships that can be cheaply built and cheaply run. The shipbuilder is in search of a high rate of profit in ship construction. So far the interests are antagonistic; but from the broader and truer standpoint they run together. The merchant wants low freights, but nothing tends so much to lower freights as cheap ships and plenty of them. He is therefore directly benefited by the increased number and prosperity of builders and shipowners. The shipowner wants cargoes; and the extension of markets and increased volume of exchanges which make the prosperity of the merchant are also a source of prosperity to himself. He, too, wants cheap ships, and to that end the surest road is a flourishing shipbuilding industry. The shipbuilder wants a great demand for his ships, and such a demand can only come through the large volume of business which is given by the merchant to the shipowner. Hence, the three interests are closely interdependent, and each must work upon broad lines for the welfare of the other. Without such co-operation ultimate success in maritime enterprise is well-nigh impossible.

The two great commercial rivals of the world to-day are the United States and Great Britain. The United States, from being considerably in advance, has fallen far behind, but, nevertheless, these two still remain the great shipping nations of the world. The secret of Great Britain's success is largely to be found in the co-operation of these three interests, by means of which all antagonisms are adjusted; and with each the first principle is, the union of all against a common rival. In America the opposite result is in great part due, if not to antagonism, at least to an absence of intelligent co-operation, and to the inability or unwillingness on

the part of one interest or the other to yield any material advantage, although thereby a great and lasting benefit may be secured for all together.

In reference to foreign commerce in its restricted meaning—that is to say, the exchange of commodities with other nations—there is not much to be said here, because, although in one sense a maritime industry, it is only so in reference to the vehicles of transportation. It does not, therefore, fall within the present subject to trace the influences under which the total imports and exports of the United States have increased from 48,000,000 in 1790 to 219,000,000 in 1845, and to 1,700,000,000 in 1891, being an average increase of 16,500,000 per annum, and during the last half century of 33,000,000 per annum. There have been occasional checks in this advance, but they have been too moderate to disturb materially the steadily increasing totals. To examine into the causes of these fluctuations would involve a discussion not only of the commercial legislation of this and other countries, but of the course of production in agriculture, mining, and manufactures, and of the laws governing markets at home and abroad. Without going into this discussion, certain facts may be noticed as indicating the close relation between the business of exchange and the business of transportation.

One of the primary elements in determining a commerce is the cost of freights. An almost infinitesimal difference in the cost of laying down grain at Liverpool may decide the question whether our surplus wheat product, in any given year, shall find a market there. If, therefore, the carrying trade is in hostile hands, sufficiently united among themselves to make a combination, it may easily, in part at least, cut off a market.

It will no doubt be said that the question of freights, like any other question of commercial profit, is regulated by the laws of supply and demand. This is true wherever unrestricted competition exists, but where one community is seeking a market and is dependent upon another for transportation, the conditions upon which transportation shall be furnished will be largely determined by the general policy of the latter in reference to the market which shall be afforded to its competitor. It is idle to say, in the face of what we see daily, in comparing the foreign commercial relations of England with those of the United States, that the carrying trade is simply a question of profit. There are combinations in reference to maritime trade and transportation as well as in every other industrial enterprise, and the policy of helping

those who are on the inside of the combination, and cutting off those who are not, goes on continuously here as elsewhere. It is perfectly legitimate, as a business method, for the various interests involved in maritime enterprise to give each other, as they invariably do in England, this mutual support, and the failure to adopt a similar policy has beyond all doubt operated greatly to the disadvantage of the United States.

The fields of commercial activity covered respectively by the two countries are shown in the following table:

Commerce of the United States and Great Britain compared.

Countries.	United States (July 1, 1890–June 30, 1891).			Great Britain, 1890.		
	Exports.	Imports.	Total.	Exports.	Imports.	Total.
Argentina	$2,820,035	$5,976,544	$8,796,579	$48,244,725	$20,097,682	$68,342,407
Austria	1,311,083	11,595,310	12,906,393	8,245,398	8,410,952	16,656,350
Belgium	27,540,424	10,945,672	38,486,096	66,168,902	84,599,146	150,768,048
Brazil	14,120,246	83,230,595	97,350,841	37,934,722	21,172,559	59,107,281
Central America	6,813,316	9,799,122	16,612,438	5,048,940	6,425,264	11,474,204
Chile	3,145,625	3,448,290	6,593,915	16,379,782	16,903,048	33,282,830
China	8,701,008	19,321,850	28,022,858	32,913,215	23,509,331	56,422,546
Colombia	3,182,644	4,765,354	7,947,998	5,886,606	1,480,687	7,367,293
Denmark	3,317,137	268,686	3,585,823	14,249,141	37,731,867	51,981,008
Danish West Indies	636,515	288,381	924,896	575,712	11,601	587,313
Ecuador	903,159	836,437	1,739,596	1,502,639	354,489	1,857,128
France	60,693,190	76,688,995	137,382,185	110,255,122	218,156,182	328,411,304
French poss. (Africa)	609,919	390,953	1,000,872	2,226,379	4,509,998	6,736,377
Germany	92,795,456	97,316,383	190,111,839	148,501,482	126,885,866	275,387,348
Great Britain	445,414,026	194,723,262	640,137,288	.....	.....	.....
Gibraltar	480,105	82,829	562,934	4,360,798	242,828	4,603,626
British North America	39,843,755	40,434,535	80,278,290	40,259,302	60,661,105	100,920,407
Br. W. I. and Br. Guiana	11,637,880	21,176,390	32,814,270	19,089,537	13,209,078	32,298,615
British Honduras	462,839	219,090	681,929	579,843	1,339,714	1,919,557
British East Indies	4,400,103	23,356,989	27,757,092	190,862,689	200,929,783	391,792,472
Hong-Kong	4,768,697	563,275	5,331,972	13,347,642	5,961,774	19,309,416
Australasia (British)	13,017,132	6,239,021	19,256,153	123,950,698	142,835,881	266,786,579
British poss. (Africa)	3,141,799	959,401	4,101,200	53,976,955	36,168,676	90,145,631
Greece	159,445	1,378,333	1,537,778	6,010,742	9,551,956	15,562,698
Haiti and Santo Domingo	6,983,564	4,853,814	11,837,378	2,663,965	436,005	3,099,970
Italy	16,046,925	21,678,208	37,725,133	41,478,197	15,056,552	56,534,749
Japan	4,807,693	19,309,198	24,116,891	20,377,850	4,988,128	25,365,978
Mexico	14,969,620	27,295,992	42,265,612	9,794,133	2,642,407	12,436,540
Netherlands	24,113,977	12,422,174	36,536,151	80,034,414	125,846,846	205,881,260
Dutch East Indies	2,102,942	6,778,992	8,881,934	8,151,650	5,951,910	14,103,560
Peru	1,399,991	386,518	1,786,509	6,009,378	5,127,365	11,136,743
Portugal	4,987,138	1,618,252	6,605,390	12,714,402	14,318,186	27,032,588
Russia	7,925,592	4,833,345	12,758,937	43,049,321	115,583,598	158,632,919
Spain	14,619,335	6,033,481	20,652,816	37,752,695	60,870,775	98,623,470
Cuba and Porto Rico	14,380,122	64,878,505	79,258,627	14,158,123	622,447	14,780,570
Other Spanish possessions	305,058	5,206,746	5,511,804	7,446,674	8,866,485	16,313,159
Sweden and Norway	4,943,180	3,723,201	8,666,381	34,076,542	57,942,227	92,018,769
Turkey	330,609	6,260,835	6,591,444	52,562,380	64,168,374	116,730,754
United States	.....	.....	.....	225,513,669	473,429,418	698,943,087
Uruguay	1,076,575	2,356,739	3,433,314	10,059,324	1,653,888	11,713,212
Venezuela	4,784,956	12,078,541	16,863,497	4,076,152	1,581,558	5,657,710
All others	11,489,439	33,129,241	44,618,680	43,629,005	47,112,809	90,741,814

Social and political as well as commercial conditions affect the business of transportation. On the west coast of South America the trade is entirely in English hands, although the

English have there no natural advantage over the Americans. Australia and New Zealand have an extensive commerce; they lie nearer to the United States than to England; they need much that we produce as well as or better than any other nation in the world, and they produce much that we want: yet virtually their whole commerce goes to England. In 1879, Australia sent $35,000,000 of wool to the mother country, of which the United States bought over $23,000,000, thereby paying double freights and double cost for handling. Our total trade with British Australasia in 1890 was $19,000,000, while the trade of the United Kingdom with that region during the same year was $266,000,000.

A new branch of commerce will call into existence the tonnage movement or carrying trade necessary to keep it up; but the converse is also true, that the establishment of regular vehicles of transportation on a given route will develop a commerce simply by giving access to a market. It is the same law that governs in railroad traffic: the necessity for exchange of surplus products in two directions creates a demand for rail communication, and, on the other hand, the connection of two points by rail invariably leads to an exchange of surplus products. If the lines of transportation under such circumstances are all controlled by a commercial rival, the market will be worked, as far as possible, for the benefit of the rival.

The co-operation of allied interests which has always been a feature of the commercial policy of England and one of the chief factors in her success, presents a phase of commercial development from which we may well take a lesson. The principle of co-operation is familiar enough in most branches of business in America. We see every day illustrations of it in the great commercial centres. We see its workings frequently in smaller cities where the men with capital or credit unite in a group to control a store, a bank, a savings bank, an insurance company, and possibly a manufactory and a real-estate agency, and, by operating each institution for the benefit of all, put the financial business of the community almost in the hands of a partnership. The application of the same principle of co-operation to the allied interests of commercial exchange, shipowning, shipbuilding, and, by no means least, marine insurance, is tending slowly but surely to reduce the commercial transportation of the world to an English monopoly.

To pass from commerce proper to the question of the carrying trade, from the interest of the shipper to the interest of the shipowner, it is easy to define the general conditions favorable to the

existence of such a trade in any particular country. Among these are a central geographical position, good harbors, and a population sufficiently endowed with a spirit of daring and enterprise, which last becomes tenfold more productive when combined with the instinct of trade. The conditions that sustain commerce also sustain the carrying trade, namely, abundance of surplus products of one kind and the necessity of obtaining abroad another kind. In the absence of these conditions, a negative influence may be found in the want of a soil of a quality or extent to render agriculture profitable, or in the absence of mechanical aptitude and tendency in the people. The first of these influences is strikingly illustrated in Norway and Sweden, whose geographical position is unfavorable, but which nevertheless have taken a high place among maritime nations, and are attaining a high degree of maritime prosperity. In Great Britain both the negative and positive influences exist. It lies at the gateway of Europe. Its harbors are unsurpassed. To its people the occupation of following the sea comes almost by nature. Its soil in many districts offers little inducement to agriculture, while the system governing land tenures and the descent of landed estates is distinctly opposed to small holdings, and to the encouragement of an independent and numerous class of landowners and farmers.

Except those last mentioned, most of the conditions prevailing in England are found in the United States, and some of them in a higher degree. The position of the country marks it as a pivotal state in the future maritime development of the world. A seacoast of twelve thousand miles, bordering on two oceans, abounding in admirable harbors, and an interior traversed by the largest navigable rivers in the world, supplemented by a vast mileage of railroads and canals, with a unique formation, on its inland frontier, of navigable lakes so extensive as to form small oceans in themselves, are conditions whose adaptation to maritime industry can hardly be equaled elsewhere. Add to this an immense production of commodities which other nations not only want but must have, and an aggregate wealth sufficient to purchase $800,000,000 per annum of their surplus products, with a sea-loving population on the coast that has never found its superior in nautical occupations, and it would seem that nothing could stand in the way of uninterrupted growth and prosperity.

In reference to our position several points are to be noted. The first is the absolute and total separation from each other of our two centers of commercial and maritime activity, the Atlantic

and Pacific coasts. The space of ocean to be traversed in order to go from one to the other is very great, and out of all proportion to their actual distance apart. It resembles the situation of France between the Mediterranean and Atlantic coasts, but on a vastly greater scale. The result is that traffic and transportation between the two must, in the nature of things, be to a great extent inland.

This brings us to the Nicaragua Canal and its influence upon the future of American commerce. The importance of the canal can not be overestimated. At the present time the distance between New York and San Francisco by water is 13,000 nautical miles. The distance by the Nicaragua Canal will be 4,920 miles —a saving of 8,170 miles, or nearly two thirds. By the present route the distance from New York to Valparaiso is 8,460 miles, by the canal 5,035 miles. Callao, which is now 10,000 miles from New York, will then be 3,500. By the Suez Canal New York is 14,230 sea miles from Wellington, New Zealand, and 13,000 from Yokohama; by the Nicaragua Canal it will be 8,600 miles from the first and 9,250 from the second.

In view of these facts it is not easy to estimate the extent of the change to be wrought in American commerce by the building of this canal. That it will produce immediately an enormous development in the business of exchanges and also in the carrying trade is undeniable. To-day the west coast of South America is nearer to Liverpool than it is to New York, and to the shipping of the United States it is a sealed country. With the building of the canal it will be nearer than the east coast, and New York will be almost a half-way station between it and Liverpool. The bight formed by the Gulf of Mexico and the Caribbean Sea will no longer be a *cul-de-sac*, but a point on the great highway of commerce. Not only South America, but the whole stretch of the South Pacific, Australia, New Zealand, and even China and Japan, will be brought within practicable commercial communication under conditions more favorable than those at the command of any other nation. Under the circumstances it is an essential feature in any plan of the development of American commerce that the canal should be constructed at an early date, and that it should be permanently established under American ownership, placed firmly under American control, and rendered secure by American protection.

Another point is to be considered in comparing the geographical advantages of Great Britain and the United States. The

great area of the United States is at home, within the coast line. The great area of Great Britain is abroad, and every quarter of the globe has its outlying station of English commerce. Here is the basis of a shipping movement far in excess of that demanded in the United States. Lines of communication and of traffic must be kept open between Great Britain and her colonies even though trade with the rest of the world should cease. This traffic amounts to over $900,000,000 per annum, more than half as large as the total exports and imports of the United States with all the rest of the world.

Another and equally important consideration presents itself in comparing the conditions of the two countries. The area of the United States is 3,025,600 square miles; the area of Great Britain is 121,481 square miles. The development of this new country, so vast in its extent, so insatiate in its demands for money to sustain the enterprises required by its internal growth, has absorbed immense amounts of capital, which might otherwise have been devoted, in part at least, to the development of the merchant marine. We may therefore say that one reason why we have not gone to any greater extent into the business of shipowning for the purpose of foreign commerce is because we had more profitable or more attractive uses to which our money could be put at home. England, on the other hand, in which eighteen hours' railway journey would take a man from one end of the country to the other, has found in internal development no such field for the employment of capital, and its vast stores of accumulated wealth have sought investment in commercial and industrial enterprises, each of which has a representative example in the carrying trade and in shipbuilding. But the employment of capital, whether in these or any other directions, and whether invested with or without active labor on the part of the investor, has been followed by no such returns as in America, where until recently the ordinary rate of interest was seven per cent, as against three per cent in England. If shipowning and shipbuilding, the carrying trade, and the art of constructing the instruments of the trade, stood on the same footing as ordinary pursuits, their present neglected condition would not be a source of special alarm, seeing that the prime cause of this condition is to be found in the diversion of capital to more profitable employments. But, unfortunately for us, they do not stand on this ordinary footing.

A national merchant marine is a national benefit in and of itself. The aggregate earnings of the carrying trade reach a very high

figure. The total imports and exports to and from the United States for thirty years, from 1860 to 1890, amounted to $31,500,000,000. The estimated cost of the freight is ten per cent, or $3,150,000,000, amounting for the thirty years to $105,000,000 per annum. Add to this the receipts from the carriage of passengers, estimated at about $25,000,000, and we have as the average gross earnings of the carrying trade to and from United States ports during these years $130,000,000 per annum. To show how moderate this estimate is, it may be stated that the actual amount in 1890 was over $200,000,000. During this period the average proportion of the carrying trade taken by foreigners was about seventy-four per cent. Latterly, as we know, it has reached eighty-seven per cent; but, taken at the average figure, it amounts to $96,000,000 per annum, or, taking the aggregate, it may be stated without exaggeration that the amount paid by the United States to foreign shipowners during the last thirty years for their proportion of the carrying of its ocean freights and passengers is nearly $3,000,000,000.

In the year 1860 we still held sixty-six per cent of the carrying trade. As the average annual amount of gross earnings from this source since that time has been $130,000,000, if we had maintained the ratio of 1860 we should have made annually during the period referred to sixty-six per cent, or $85,000,000, instead of twenty-six per cent, or $33,000,000. Our loss, therefore, from the falling off of this branch of American trade may be estimated during these thirty years at a little over $50,000,000 per annum.

It may be roughly estimated that the total freight earnings of the commerce of the world amount to $500,000,000 a year, of which from one half to three fifths is absorbed by British shipping. In fact, it is not too much to say that five per cent of the total value of all the exports and imports moved in a year in the world is the compensation paid to British shipping for the part it takes in the work of transportation. If the United States had half of what may be called its own business, instead of only one tenth, it would require double our present tonnage to carry it on.

There is no other form of business in which it is possible for one country to put another under such heavy tribute merely for the rendering of services which all are equally competent to perform. If another state has products which we must have to live, or even which we desire to have, we pay for them by the sales of our own products abroad. But the apparent balance of

trade, as shown by a comparison of exports and imports, is largely modified by freight earnings. To make a complete statement, the freight paid our own vessels on imports must be deducted from our total imports, and the freight paid our vessels on exports must be added to our total exports; for by just so much is the cost to us of our imports lessened and the return from our exports increased. The larger the freight earnings of American tonnage in the foreign trade, the larger will be this favorable factor in the balance of trade. If our freight earnings were $33,000,000 a year, the average figure since 1860, instead of $22,000,000, as in recent years, the additional $11,000,000 of freight earnings would go to reduce the balance of trade against us, or to increase that in our favor.

But the commercial advantage of a merchant marine is not merely a question of freight earnings. Lines of shipping, as has been already pointed out, create commerce and create markets. The merchant marine may be said to be the most important agency in the creation and control of foreign markets, except in cases of practical monopoly arising from the force of special circumstances. It is the essential link in the business of one country with the rest of the world, and it is for the interest of any country, apart from mere questions of totals on the ledger, to control that part of it upon which the movement of its own imports, and still more of its own exports, depends. If our whole business of ocean transportation is in the hands of a foreign power, our commerce is dependent not alone upon our own international relations, but on those of the state whose merchant marine does our carrying. Commercially speaking, the development of our carrying trade gives us the same advantage that the control of any of the auxiliary agencies of financial business gives to the capitalist. Upon the number and extent of such agencies under his control depends largely the influence which he wields in the commercial community. In precisely the same manner the possession of a flourishing merchant marine strengthens every department of business dependent on ocean transportation, and gives to a people increased weight and influence in all its business dealings, individual or national, with other commercial communities.

The possession of a merchant marine is also an important factor in national defense. To a country in the situation of the United States, compelled to rely mainly on maritime strength for protection from attacks from abroad, it is indispensable. It is the

only nursery for seamen. It supplies the only reserve of vessels in time of war. Without it a navy is crippled at the very moment when its services are needed. A state as vulnerable as the United States to maritime attack, with its extensive seaboard and its rich commercial ports, can not afford to be without this essential element of protection.

What has been said of shipping applies equally to shipbuilding. No state can be considered fairly equipped with the means of maritime defense unless it is able to build its ships of war within its own borders. Nor is it desirable to have this work wholly done in Government establishments. There must be private as well as public yards to which the Government will be able to turn in an emergency.

Apart from the question of defense, however, there is hardly any branch of manufacturing industry more important to a maritime state than shipbuilding. It employs, directly or indirectly, a great number of mechanical trades, and its ramifications extend in all directions. The gross receipts of the shipbuilding trade in England to-day amount to over $60,000,000 per annum. The immense plant and capital now required for its successful prosecution, and the nicety and complexity of the work, calling for the highest forms of mechanical labor, make it peculiarly difficult to establish. The conditions under which this country labored, when iron ships were first adopted, in the competition of the old-fashioned type of vessel on the one hand, whose manufacture was firmly established in America, and in the superior facilities for the new industry in England on the other, retarded for many years its development. Since that time the conditions have been greatly altered. One half of our annual building tonnage is now of steam, and one fourth of iron or steel; while in both these respects the movement of the past few years has shown a steadily increasing proportion. Although we may not look for any sudden and phenomenal development, the certainty that this increase will continue holds out abundant promise for the future of iron and steel shipbuilding in America.

The influences affecting the development of the merchant marine naturally group themselves into two classes: first, those which are voluntary, or arise from the act of the Government; and, second, those which are involuntary, or arise from the conditions of trade. The first class of influences, arising from the acts of the Government, consist also of two kinds—those which

Pilot boat at sea in a hurricane.

are directed, first, toward the encouragement of home industry; and, secondly, toward the injury of a rival industry.

The first class of protective measures, known as bounties or subsidies, has been the subject of extensive and heated dispute in America. It has been considered under three phases—a bounty on shipbuilding, a bounty on navigation, and a compensation for mail service. Only the first two can be properly spoken of as bounties. Neither of them has ever been tried in this country.

The French system of government protection to shipping gives an illustration of all three classes of bounties. It provides, first, a bounty to shipbuilders of from ten to sixty francs per ton, according to size and material, to be paid to shipbuilders upon all new tonnage built, as a compensation for the imposition of duties on materials used in shipbuilding. The amount paid to shipbuilders under the law during the first seven years of its operation (1881–1887) averaged $502,100 per annum.

The French law provides, secondly, a bounty to shipowners on the voyages made by their ships, amounting to 1.50 franc per ton per thousand miles run, excluding short voyages to neighboring points. It is provided as a compensation to the merchant marine for the burden laid upon it by the recruiting of seamen for the navy. It has an annual rate of decrease, and a reduced rate on ships built abroad. The Government paid under this provision of the law, during the first seven years of its enforcement, at an average rate of $1,374,647 per annum.

The law provides, thirdly, for the payment of postal subsidies, or compensation for carrying the mails. Under this provision two lines are subsidized: the Compagnie Générale Transatlantique, which receives $864,254 per year for carrying the mails between France and the West Indies; and the Messageries Maritimes, which is paid at the rate of one dollar per mile for a semimonthly mail service between France and Buenos Ayres, etc.

Although the merchant marine of a maritime state has a peculiar claim upon its bounty, if it adopts bounties at all as a feature of its economic system, yet the inherent objections to such a system are so great and so obvious that it is hardly worth discussion. It is not likely that it will ever be adopted in the United States. Compensation for mail service, however, stands on a footing by itself, quite apart from that of bounties properly so called. "A postal subsidy," says Mr. Fawcett, "is simply a payment made for the conveyance, under certain specified conditions as to time

and speed, of postal matter." It is nothing more than a compensation for services rendered, and it is not only common sense but common justice to award it to national steamship lines on the most liberal basis possible.

The following table shows the total amount paid by the United States for mail service during each year since 1848, and the proportions of the total paid respectively to American and to English vessels. It also shows the amount of bounty or subsidy actually paid to British ships by Great Britain:

Years.	Total amount paid.	Amount paid vessels sailing under American flag.	Bounty or subsidy paid to foreign flags by the United States.	Per cent paid American ships.	Per cent paid foreign ships.	Bounty or subsidy paid British ships by Great Britain.
1848.....	$100,500	$100,500	.....	100	....	$3,250,000
1849.....	235,086	235,086	.....	100	....	3,180,000
1850.....	619,924	619,924	.....	100	....	5,313,985
1851.....	1,465,818	1,465,818	.....	100	....	5,330,000
1852.....	1,655,241	1,655,241	.....	100	....	5,510,635
1853.....	1,880,273	1,880,273	.....	100	....	5,805,400
1854.....	1,903,286	1,903,286	.....	100	....	5,950,559
1855.....	1,936,715	1,936,715	.....	100	....	5,741,633
1856.....	1,886,766	1,886,766	.....	100	....	5,713,560
1857.....	1,589,153	1,589,153	.....	100	....	5,133,485
1858.....	1,211,061	1,177,303	$33,758	92.2	7.8	4,679,415
1859.....	1,204,569	1,079,220	125,349	89.2	10.8	4,740,190
1860.....	854,329	707,244	147,085	82.6	17.4	4,349,760
1861.....	806,885	570,952	235,933	70.7	29.3	4,703,285
1862.....	374,618	80,686	293,932	21.6	78.4	4,105,353
1863.....	416,075	79,398	336,677	19.1	80.9	4,188,275
1864.....	440,440	64,356	376,084	14.6	85.4	4,503,050
1865.....	475,428	66,571	408,857	14.2	88.4	3,981,995
1866.....	713,928	245,605	468,324	34.4	65.6	4,227,018
1867.....	867,203	411,065	456,138	47.4	52.6	4,079,966
1868.....	1,016,146	625,239	390,907	61.5	38.5	4,047,586
1869.....	1,101,689	757,963	343,726	68.8	31.2	5,481,690
1870.....	1,115,333	791,388	323,945	71.7	28.3	6,107,761
1871.....	975,025	799,662	175,463	71.7	28.3	6,070,741
1872.....	1,026,891	805,788	221,003	78.4	21.6	5,693,500
1873.....	1,044,157	815,400	225,757	78.1	21.9	5,665,296
1874.....	988,393	750,295	238,098	75.9	24.1	5,697,346
1875.....	976,644	740,360	236,283	75.8	24.2	4,860,000
1876.....	753,610	580,062	173,548	76.9	23.1	4,420,261
1877.....	448,896	286,834	162,062	63.9	36.1	3,976,580
1878.....	199,979	40,152	159,827	20.1	79.9	3,914,990
1879.....	200,026	41,251	158,775	20.6	79.4	3,768,230
1880.....	199,809	38,779	161,030	19.4	80.6	3,873,130
1881.....	240,067	42,553	197,514	17.7	82.3	3,601,350
1882.....	200,500	40,645	239,855	14.4	85.6	3,538,835
1883.....	316,358	48,077	268,281	15.2	84.8	3,608,800
1884.....	332,221	53,170	279,051	16.0	84.0	3,608,355
1885.....	331,903	49,048	382,855	14.8	85.2	3,642,065
1886.....	329,391	43,319	286,072	12.8	87.2	3,662,505
1887.....	412,673	76,727	335,946	17.8	82.2	3,625,915
1888.....	463,418	86,890	376,528	18.1	81.9	3,490,864
1889.....	515,401	109,828	405,573	21.3	78.7	3,184,425
Total.....	$33,945,828	$25,378,593	$8,628,235	....	....	$188,476,295

The rate hitherto paid for the carriage of mail matter, as fixed by the International Postal Congress, is five francs per kilogramme for letters, or about forty-four cents per pound. To American ships the United States Government is authorized by statute to pay "sea and inland postage," so called, averaged at $1.60 per pound. In 1889 the amount paid for mail service by the United States, as shown by the above table, was $109,828 to American vessels and $405,573 to foreign vessels. Under this arrangement, out of a total of $515,401, the American merchant marine received about one fifth and foreign vessels about four fifths.

It will also be seen from the table that the United States has contributed, during the last forty years, to the support of foreign shipping the sum of $8,628,235, of which probably seventy-five per cent was British; that the British Government during this same period has paid to British ships $188,476,295, making a total for British ships of about $195,000,000. The amount paid by the United States to American shipping during the same period was about $25,000,000, making the excess in favor of British shipping $170,000,000. It is impossible that the amount, averaging over $4,500,000 a year, which has thus been paid to British shipping, small though it is in comparison with gross earnings, and limited as is the number of lines receiving it, should not have had a material effect in encouraging that branch of business. This effect is still more apparent when we consider the apportionment of the postal subsidy during the early period, especially as illustrated in what has been said above of the Cunard line; which was thereby enabled to pass smoothly and with uninterrupted success through the most critical stage of its existence.

In addition to the amounts paid for mail service the English Government gives an annual subsidy to certain vessels of an exceptionally high class, in consideration of which the owners engage to hold the vessels for hire or purchase upon certain prescribed terms on receipt of notice of the Admiralty's intention to make use of them. The owners also agree, in case of receiving an offer for sale or charter, to give the Admiralty for a limited time a prior option. The subsidy which is the consideration for this agreement amounts to fifteen shillings per gross registered ton per annum for each ship, and is additional to the mail subsidy. The ships included in this agreement are ten in number: the Etruria, Umbria, and Aurania, of the Cunard Line; the Victoria, Britannia, and Oceana, of the Peninsular and Oriental Steam Navigation Company; the City of Paris and the City of New York,

of the Inman Line; * and the Teutonic and Majestic, of the White Star Line. The amount paid under these agreements is as follows:

Cunard Line, three vessels	$85,710
Peninsular and Oriental Steam Navigation Co., three vessels	70,826
Inman Line, two vessels	78,742
White Star Line, two vessels	72,637

Three other vessels—the Empress of India, Empress of China, and Empress of Japan, of the Canadian Pacific Line—have recently come within the benefits of the subvention. They form an addition of the greatest importance, not only on account of their high qualities, but from the fact that their home is in the north Pacific. Still more recently the two new Cunarders Campania and Lucania have been added.

Nothing similar to this last plan of subvention, by which money is paid for a mere option, has ever been adopted in the United States. The only form of subsidy, other than the "sea and inland postage," has been the limited postal subsidy paid from 1850 to 1858 to the Collins Line, and from 1865 to 1876 to the Pacific Mail, and a few other isolated cases of small importance, which have been mentioned above. The payment of a fixed sum per ton for an option on vessels suitable for conversion into naval cruisers is open to no objection, even at considerably higher rates than those given above, and, while contributing to the growth and prosperity of the merchant marine, is an economical and suitable measure of national defense. There is no reason why such a plan should not be adopted in the United States, and in view of our naval necessities, it might well be extended to all sea-going and lake steamers of fifteen knots and upwards, suitable for naval use, the rates being graded according to the performance of the vessel. It should, as in Great Britain, be additional to the mail compensation.

The first comprehensive plan for the payment of increased rates for ocean mail service to American vessels is to be found in the act of March 3, 1891, passed by the Fifty-first Congress. Under this law the Postmaster-General is authorized to enter into contracts for a period of between five and ten years, with American citizens, for the carrying of mails on American steamships between ports of the United States and such ports in foreign countries as in his judgment are desirable. The law does

* Now withdrawn, the vessels having been admitted to American registry.

not specify any particular line or company to receive the compensation. The Postmaster-General, by advertisement, describes the routes and conditions, and the contracts are let to the lowest responsible bidder. Ships are classified according to their size and speed, and the rate of compensation provided is limited to four dollars a mile for ships of the first class, two dollars for ships of the second class, one dollar for the third class, and two thirds of a dollar for the fourth class, for each outward voyage. A further important provision of the law is that which requires vessels of the three higher classes to be constructed with reference to prompt and economical conversion into auxiliary naval cruisers, and to be of sufficient strength and stability to carry at least four modern six-inch rifles; provision being made for their inspection by the Secretary of the Navy. The only objection to this law is that it does not go far enough in offering substantial inducements for the creation of a national mail service.

The first advertisement under this act was issued July 15, 1891. Under that advertisement five mail contracts have been provided for—three with the Pacific Mail Steamship Company, one with the Red D Line, and one with John B. Clarke, of Chicago. Of the three Pacific mail contracts, which went into effect on the 3d of February, 1892, one is from New York to Colon every ten days, at the rate of one dollar per mile; one from San Francisco to Panama every ten days, at sixty-six and two thirds cents per mile; and the other from San Francisco to Hong-Kong every four weeks, at the rate of one dollar per mile. The contract with the Red D Line, from New York to La Guayra, began on the 1st of March, 1892, and provides for a service every ten days, at the rate of one dollar per mile. The fifth contract, with John B. Clarke, of Chicago, provides for a service beginning on the 1st of May, 1893, from Galveston to La Guayra, at the rate of sixty-six and two thirds cents per mile.

The second advertisement was issued on May 25, 1892, and bids were opened on the 5th of September. Two bids by the Inman Steamship Company were accepted, to go into operation within a period of three years. One route is from New York to Southampton weekly, at the rate of four dollars per mile; the other is from New York to Antwerp, calling at Southampton and a French port not yet designated, also weekly, at the same rate.

Two bids of the United States and Brazil Mail Steamship Company, to take effect two months after the signing of the contract, have been accepted: one from New York to Buenos Ayres,

calling at Rio and other intermediate ports, at sixty-six and two thirds cents per mile, service every forty-five days; the other from New York to Rio, calling at certain intermediate ports, at the rate of sixty-six and two thirds cents per mile, service every twenty-four days.*

Two bids were also made by the New York and Cuba Mail Line, to take effect on the 1st of November, 1892: one from New York to Tuxpan, Mexico, calling at intermediate ports; the other from New York to Havana. Both are at the rate of one dollar per mile for a weekly service.

The compensation for mail service as provided for in the above contracts will aggregate considerably less than $2,000,000 per annum.

In reference to the operation of the bill, the Postmaster-General, in his annual report for 1891, states as follows:

"The bill now in force is the first of general application. It contemplates a general system of postal compensation, based upon classified efficiency as to tonnage and speed of ships, leaving the administrative work of selecting routes and establishing service discretionary with the Post-Office Department, and providing for the ready conversion of the employed vessels into auxiliary men-of-war. The rate of compensation is by no means liberal; in fact, many persons conversant with the conditions under which American merchant steamers must be operated consider it below the limit of practical encouragement.

"The subsidies paid to steamship companies during the year 1889 (from General Statistics of the Postal Service, published by the International Bureau, Berne, Switzerland, in 1890) were as follows:

France	$4,953,112 41
Great Britain	3,210,434 37
Germany, so far as can be ascertained	1,261,400 00
Italy	1,957,947 40
Spain	988,977 02
Japan	739,576 00
British India	293,186 30
Netherlands	167,446 80
Belgium	152,139 30
Chili	48,250 00
Denmark	44,152 50
Roumania	926 63
Tunis	386 00

* This company has now gone out of existence.

"With receipts for foreign postages estimated to average $1,700,000 per annum, and an outlay for this service not exceeding $600,000 per annum, it would seem as if the sum turned into the United States Treasury from this source might properly be applied to the encouragement of an American marine, and thus reserve to American enterprise the rewards for carrying American mails.

"The Post-Office Department, under existing laws limiting compensation to sea and inland postage, or to sea postage only, as the case might be, could not command any ocean service. It could only use such service as offered, and was entirely dependent upon commercial conditions as to dates of sailing. These considerations, and the manifest desire of the people to strengthen our naval fleets, resulted in the passage of the bill of March 3d. This act looks in five specific directions:

"1. To secure regular and quicker service to countries now reached.

"2. To make new and direct commercial exchanges with countries not now reached.

"3. To develop new and enlarge old markets in the interest of producers and consumers, under the reciprocity treaties completed and in progress.

"4. To assist the promotion of a powerful naval reserve; and

"5. To establish a training school for American seamen."

The second class of Government acts affecting the development of a merchant marine comprises those which are directed not so much toward the encouragement of home industry as toward the injury of a rival industry. Three methods have been adopted by different governments of controlling the relations of domestic and foreign carriers to their international commerce. The first is a purely restrictive system, either prohibitory, as where the whole carrying trade or a certain branch of it, such as that with the colonies, is forbidden to foreigners; or merely discriminating, as where differential duties are levied upon imports carried in foreign ships, or upon foreign tonnage, to burden the foreign carriers. The second is founded on reciprocity, or the equality of restrictions on both sides. The third is a system by which, without regard to the action of foreign countries, all branches of trade are open to foreigners on the same footing as to natives.

The first of these systems is the ancient device of the English navigation laws, which prevailed from 1650 to 1850, which reserved the coastwise and colonial trade to subjects, and admitted

foreigners to the general carrying trade only when bringing in their own products.

A modification of the same principle was put in operation in our own early navigation laws, not by means of prohibitions, but by the imposition of heavy discriminating duties. At that period of our history, when we had only the beginnings of a merchant fleet, its effects were marked and rapid. It was one of the prime causes that contributed to raise our tonnage in the foreign trade within a score of years from 25,000 to 980,000 tons, and our proportion of the carrying trade of our own exports and imports from twenty-three to ninety per cent. During this period, our merchant marine rose from a condition of absolute unimportance to a place almost and in some respects quite at the head of the merchant fleet of the world.

There are those who think that these results were brought about independently, or in spite, of restrictive legislation. But it is absurd to suppose, looking at the conditions existing when the laws were passed, and at the startling results that immediately followed, that the two facts did not stand in the relation of cause and effect. There were other causes, no doubt, but none more efficient than this. It must not, however, be inferred that a revival of the old system would be attended with the same results to-day. Our early navigation laws were adopted at a time when every country had its restrictive system, which a struggling community, attempting to open a carrying trade, could only offset by similar methods. Under our present conditions, the renewed application of such a system to our direct trade would be not only disadvantageous but destructive. The great expansion of commerce, and the fact that restrictions can be imposed equally by the state to which the ship belongs and by the foreign state to which she brings her cargo, make such measures impossible. If we prohibited German ships from trading with us, our ships would be prohibited from trading with Germany. International trade is only possible to-day on a basis of international forbearance, and a system of restrictions would be immediately followed by retaliation that would cut off international trade altogether.

But all this, as has been indicated above, applies only to our direct trade. The removal of restrictions upon importations in foreign vessels other than those belonging to the country in which the goods were produced was a precipitate step, which has been productive of serious and harmful consequences. There are many countries which are in a condition to carry on the business of

Farragut's flagship Hartford.

commercial exchanges, but which are not prepared to engage in the business of transportation. Many of these countries, by their geographical position, and still more by the condition of their markets, both as to supply and demand, are naturally thrown into commercial relations with the United States. But their transportation business even to and from our own ports is not in our hands. The removal of restrictions has permitted English carriers to obtain complete possession of these lines of traffic, which might and should have been occupied by the United States. The question of retaliation does not enter here to any greater extent than it does in the coasting trade; and had we adhered to a restrictive policy, at least for a time, we might have developed a carrying trade, especially to South American ports, that would not only have been valuable in itself, but would have had a beneficial influence upon the kindred business of exchanges. As it is, our only regular line to the east coast of South America is bankrupted by foreign competition. It is probably too late now to change the system, even if Congress could be induced to change the law. We have thirty-two treaties involving the principle of reciprocal freedom in the carrying trade, direct and indirect, and they include nearly every maritime state in the world with which we have commercial relations.

The third system, by which all restrictions are removed without reference to the action of foreign states, is that adopted by Great Britain in the repeal of the navigation laws in 1850. In practice its results are the same as those of a system of reciprocity. The United States might to-day repeal all the conditional discriminations still subsisting on the statute-books, and throw open its trade unconditionally, as has been done by Great Britain, without causing any material extension of the privileges actually enjoyed by foreign vessels. The difference in prosperity in the merchant marine of the two countries is due to the difference not in systems, because these are virtually the same, but in the conditions to which the systems are applied.

The second great class of influences, which may be called involuntary, are those which are due to commercial conditions. These will be considered under the following heads:

1. Development of shipbuilding.
2. Cost of building ships.
3. Cost of running ships.
4. Comparative inducements offered for the employment of capital.

1. *The Development of Shipbuilding.*

The wooden sailing vessel, after it reached its full development in the first half of this century, remained practically stationary. It not only failed to improve to any marked extent, but from inherent limitations of type it was incapable of improvement. The best sailing clippers, with exceptionally favoring conditions of wind and sea, might make fifteen knots an hour; but no novel arrangement of sails or adaptation of rig could increase this rate, nor could any human ingenuity improve conditions of wind and sea, or secure for the vessel the weather that she needed.

The steamer, on the other hand, devised with the intention of relying on mechanical conditions in the structure, was from the start independent of natural or external conditions, and has consequently been the subject of a continuous and extraordinary development as mechanical laws were better understood and new methods of applying them were invented. At the beginning the marine engine was slow in making its way into popular favor. After several abortive attempts, the first really successful step was the building of the Clermont by Fulton in 1807, and her profitable employment on the Hudson River as a passenger boat between New York and Albany. Her speed was five miles an hour, and she was considered a startling phenomenon, as indeed she was. She made the trip, which is now easily done in eight hours, in thirty-two. In 1811 she was followed by the first steamboat on the Mississippi River, built at Pittsburg. In 1812 the famous Comet, forty feet long, with paddle-wheels to which the power was transmitted by gearing, was put afloat on the Clyde.

During the next few years steamers multiplied upon our rivers, and were introduced extensively in the coasting trade both in America and in England. Not until 1819 was the first attempt made to cross the Atlantic. This was done by the Savannah, a sailing vessel with auxiliary steam power, built at New York for the New York and Savannah Line. She made the passage to Liverpool in twenty-five days, during eighteen of which she used steam.

Notwithstanding this voyage, and one made under similar conditions in 1825 by the Enterprise, from Calcutta to London, the fact was not yet demonstrated that steamers could make long ocean trips relying solely on steam. The proposition that such a voyage could be made was generally ridiculed. Consequently, when in 1836–'38 Brunel built the Great Western and Laird the Sirius, to make the transatlantic passage under steam alone, no

great confidence was felt in their success; and the arrival of these two pioneers of Atlantic passenger traffic at New York on the same day, April 23, 1838, marks the beginning of that gigantic revolution in ocean navigation which has made possible the commercial development of the last fifty years, and of which the end is not yet.

Close upon the heels of this success came the establishment of the Cunard line in 1840, with its four wooden side-wheelers, followed by the Collins Line in 1849 and the Inman in 1850. The latter showed a more progressive tendency than its conservative rival, Cunard, by starting its service with the iron screw steamer City of Glasgow. The first iron Cunarder was built in 1855, and even as late as 1862 it built the side-wheeler Scotia.

Other competitors for the trade between America and Europe started up almost immediately, and for thirty years the establishment of a new line of regular steamers was witnessed at least every second year. It is only possible here to mention the names of the most important: The Allan Line, in 1854, which, stopping at Halifax *en route*, has had an important influence in the development of British North America; the Hamburg-American Packet Company, in 1855; the Anchor Line, in 1856, between Glasgow and New York; the North-German Lloyd, at Bremen, in 1857; the Leyland Line, between Boston and Liverpool; the Compagnie Générale Transatlantique, between New York and Havre, in 1862; the National, in 1863; the Williams & Guion, in 1866; the White Star, in 1870; the American Line, in 1871; the State Line, from Glasgow (since absorbed by Allan), in 1872; the Red Star, from Antwerp, in 1873, which, with the Inman and American Lines, is now under the management of the International Navigation Company; the Navigazione Generale Italiana, of Genoa and Palermo; and the Thingvalla Line, from Copenhagen. Many of these companies have a second or third mail and passenger service distinct from their North American line, running steamers to Mediterranean, Asiatic, or South American ports, and their transatlantic steamers comprise only a part of the great fleets by which this commerce of the United States is now carried on.

It is not necessary here to do more than allude to the many magnificent fleets which are maintained on other lines of traffic, such as those of the Peninsular and Oriental, the Pacific Steam Navigation Company, the Messageries Maritimes, the Austrian Lloyds, the British India Steam Navigation Company, the Royal Mail Steam Packets; the Castle Line, of Donald Currie; the Liv-

erpool, Brazil, and River Plate Line; the Anglo-Australasian Line; the Compañia Sud Americana de Vapores, of Valparaiso; the Compañia Transatlantica, of Cadiz; the African Steamship Company; the Ocean Steamship Company, of Liverpool; the Union Steamship Company, of London and Southampton; the West India and Pacific, and many others. Many of these have fleets whose tonnage is more than one tenth of the whole registered tonnage of the United States, and all or nearly all of them show the same marks of progress in the construction of the modern steamer that distinguish the great transatlantic lines.

In looking at the change from the Sirius and Great Western, which were built in 1838, to the New York and Paris, the Teutonic and Majestic, and the Etruria and Umbria, we see that it has been accomplished by a great number of gradual changes, the final product of which bears little resemblance to the original structure. The first of these was the substitution of the screw, whose introduction by Ericsson has been already described, for the paddle. The objections to the latter are many: greater wear and tear, greater strain on the structure, the weight, space required and location of the engine, the sea-room taken up by the vessel's increased beam, the loss of power as the immersion is reduced, and the loss of speed from frictional resistance caused by the rush of water past the ship. All these objections were obviated by the screw, though in vessels of light draft plying in shallow waters the paddle, of course, still continues the favorite means of propulsion. In a more recent period, the old advantage of the side-wheeler in turning led to the introduction of the twin screw, which combines the advantages of both systems, and permits a material reduction in depth.

Another great advance was the replacing of the old jet by the surface condenser, by means of which the water obtained from the exhaust steam could be returned to the boiler, unmixed with salt water. Prior to this, however, the flue boiler had been laid aside and the present multitubular boiler had been adopted, greatly enlarging the heating surface, reducing the consumption of coal, and admitting of increased pressures. In 1856 the compound engine was introduced by Elder, and placed on board certain vessels of the Pacific Steam Navigation Company. The use of steam expansively in two cylinders resulted in greatly increased pressures, and paved the way for triple expansion, first applied by Napier in the Aberdeen in 1881. By 1885 the three-cylinder engine had been fully adopted. This has been further developed

in the quadruple expansion engine, which can not, however, at the present time be said to have come into general use.

The method used in locomotives of forcing a draft by a steam blast in the chimney being impracticable in ships, owing to the necessity of utilizing the exhaust steam for feeding the boiler, another process was adopted of closing the fire-room and forcing in fresh air by blowers. This is the system of "forced draft" so called, which has been the final factor in producing the very high speeds of the present day. The objection to the system is the liability of injury to boiler tubes, which are apt to be loosened in the tube sheets, and otherwise weakened by rapid expansion and contraction. Various more or less successful devices have been adopted with a view to remedy this defect.

The improvements in machinery and the adoption of steel, have enabled the builders to increase the size of the vessel, thereby securing greater economy in the carrying of a given quantity of freight and improving the weatherliness of the vessel, and making it less dependent upon outside conditions, such as head seas, which tend to diminish speed. Hence the uniformity in the rate of travel seen in the great liners of to-day. Investigations of wave-motion in connection with surface resistance have reduced ship designing, especially in reference to the lines of the hull, nearly to the condition of an exact science. Much light has been thrown on the subject by experimental work in the model tank. The White Star Line led the way in a great increase in the length of the vessel, which, though perhaps not carried out by others to such an extent, has largely modified the proportions of the structure.

The safety of ships also has been vastly increased by changes in structure, notably the division into water-tight compartments, which, if few in number or connected by doors, are an uncertain reliance, but which in the latest transatlantic steamers are twenty in number, and are separated by solid transverse bulkheads. In some cases, a longitudinal bulkhead divides the ship fore and aft. A few feet from the bow is the collision bulkhead, which enabled the Arizona to make a port after her stem had been ground up by collision with an iceberg. The double bottom, with its minute subdivisions, usual in modern warships, is rarely found in merchant vessels, nor is there quite the same necessity for it. The twin screw is an additional safeguard. Universally adopted in ships of war for the sake of greater facility in manœuvring, it has been slow in making its way in the merchant service, and as

yet is to be found only in the Inmans, which introduced it, in the two White Star "cracks," the Teutonic and Majestic, in the Touraine, the last Cunarders, and the four most recent of the Hamburgers. Yet its value as an element of safety is very great. The two screws, with two separate sets of engines, can hardly fail at the same time, unless by a miracle; and the breaking of a shaft, which compels an ordinary steamer to fall back on sails, leaves the twin screw still capable of using a complete set of propelling machinery. If to this is added a fore-and-aft water-tight bulkhead, it is possible for a ship to have an engine-room cut into by a collision, and yet proceed on her voyage.

To the multitude of minor improvements it is only necessary to make brief allusion. The systems of ventilation and of drainage have become exceedingly complicated. Electricity has furnished an improved illumination. Steam steering gear has been introduced, and steam windlasses take the place of the old capstans. The flush deck of modern steamers, open at the sides, prevents the retention of seas when shipped. Every possible device has been adopted to increase the comfort of passengers, the Collins Line leading the way, and the White Star making still further advances in this direction, which have been followed by other lines. Radical changes have been made in the interior arrangement of the vessel, and an ocean voyage has now become one of the most easy and luxurious forms of travel. Corresponding improvements have been made in the stowing and handling of cargoes, especially of grain, fruit, oil, cattle, and beef. Within the past three years a noteworthy experiment has been tried in the shape of a grain vessel of novel design, the so-called "whaleback," a cigar-shaped structure, originated on Lake Michigan, the first of which, the Wetmore, carried a cargo of eighty-seven thousand bushels, in August, 1891, from Lake Superior to Liverpool.

The results of these improvements are shown by a comparison between the performance of the early steamers and that of the latest products of the building yards, namely, the Etruria and Umbria, and finally the Campania, of the Cunard Line, built by the Fairfield Works; the Majestic and Teutonic, of the White Star Line, built by Harland & Wolff; the New York and Paris, of the new American Line, by Thomson, of Clydebank; La Touraine, of the Compagnie Générale Transatlantique, built in France; the Columbia, built by Laird, the Normannia, by Fairfield, and the Fürst Bismarck, all of the Hamburg Line; and the Havel and Spree, of the North German Lloyds.

In 1840 the consumption of coal was seven pounds per horse-power per hour. In 1890 it had become a little less than one and a half pound. The Britannia (the first Cunarder) had a tonnage of 2,050 tons; the Teutonic, of the same line, has 9,686 tons; the Paris, of the American line, 10,508 tons; and the Campania (the last Cunarder), the highest development of the shipbuilder's art in the transatlantic lines, has 17,000. The indicated horse-power of the Great Western was 750, and of the Great Eastern, was 7,650; that of the Paris is 20,100; and of the Campania, 30,000. The usual steam-pressure in 1835 was five pounds to the square inch, while at the present time it has risen to one hundred and eighty pounds to the square inch. The speed of the Great Western was eight and a half knots. The highest speed of the modern ships is over twenty-two knots, and their performance throughout the whole duration of the trans-atlantic passage is maintained at an average of between twenty and twenty-one, the actual records being 20.11 knots of the New York (eastward, August, 1892); 20.7 knots of the Paris (westward, October, 1892); and, finally, the marvelous achievement of the Campania, 20.86 knots in her first eastward trip in May, 1893.

The Sirius made the westward trip in 18 days, 11 hours, and 15 minutes. The Etruria made it in 6 days, 1 hour, and 50 minutes, only to be beaten by the Teutonic, in 5 days, 16 hours, and 30 minutes. This has again been overcome by the Paris, which in October, 1892, made the quickest passage ever known between Queenstown and New York, in 5 days, 14 hours, and 24 minutes. On this passage she made 530 knots in one day, the greatest day's run on record.

In August, 1892, the New York made the best record for eastward passages up to that date. She sailed from New York August 17th, and passed Daunt's Rock Lightship, at the entrance of Queenstown, on August 23d. The distance covered was 2,814 knots, and the time 5 days, 19 hours, and 57 minutes.

This record was beaten by the Campania on her first eastern trip. In this voyage she made 2,868 knots, and the time was 5 days, 17 hours, and 27 minutes. Her fastest day's run was 517 knots, the best on the record of eastward voyages.

The interesting question in ocean speeds now is, whether the Cramps, who stand to-day at the head of American builders on the Atlantic coast, can produce a ship that will break the record and cast into the shade the achievements of their rivals on the Clyde. The results attained by the new vessels which they are now build-

ing at Philadelphia will be watched with the most eager interest as the first great contest between American and English builders of steel steamers. The latter have the advantage of years of experience; but we have learned to put such faith in the skill and ingenuity of our own engineers and in the men that they have trained, and we have had such convincing proof of the ability with which this great establishment is conducted, that we may well look forward with hopefulness to the result. Certainly there is no one who holds dear the past maritime glories of America who does not rejoice that the opportunity has at last come for their revival, and that it is in such able hands as to give a bright promise of national triumph.

Let us now turn back to note the course in America of the movement toward the conversion of our merchant fleet from the old type to the new. Our shipowners recognized early the value of steamers, and used them in considerable numbers. In 1853 our gross tonnage built was 427,494 tons, of which 95,155, or twenty-two and a half per cent, were steamers. In the United Kingdom in the same year there were built 203,171 net tons,* of which 48,215, or twenty-three per cent, were steamers. At this date, therefore, the proportion of steamers in the total tonnage built was the same in the two countries, and it was about the same proportion that had obtained in the United States for the previous fifteen years. After 1853 the proportion of steam tonnage in the United States continued at an average of about twenty-five per cent. In England it remained for several years at about the same point, but in the sixties the average was distinctly higher, approximating thirty-six per cent, and in one year (1865) reaching as high as forty-four.

So matters remained until 1870, when the building of steamers in England suddenly rose to sixty-eight per cent of the total tonnage built. During the subsequent twenty years, from 1870 to 1890, the increased percentage, while liable to great annual fluctuations, has, on the whole, been maintained, rising even as high as eighty-six per cent in 1880 and eighty per cent in 1890. In the last reported year (1891) the figure was seventy-one per cent. In the United States, on the other hand, the movement in the direction of steam vessels has been far less marked. The percentage remained nearly stationary until 1879, when it rose to forty-

* Exclusive of colonial vessels and vessels built for foreign account.

four, increasing further in 1880 to fifty. It has remained at or about this point ever since, a temporary advance in 1887–'89, reaching sixty-nine per cent, having been followed by a decline to fifty-four in 1890 and to fifty in 1891.

We may therefore say, on the whole, that while three fourths of the ships built annually in the United Kingdom are steamers, only half of those built in the United States are steamers. Our progress in this respect, however, though long in coming, is now so certain and steady that the outlook is favorable; and while in 1865 but twenty per cent of our total tonnage was of steam, in 1891 forty-three per cent is of steam.

But it is not only the steamer that has displaced the sailing vessel, but the iron steamer that has displaced the wooden sailing vessel, or, indeed, the wooden vessel of any kind. The advantages of iron have already been fully pointed out. Here it is enough to say that there was no more doubt in 1855 that iron would ultimately displace wood than that steam would ultimately displace sails. The United States has proceeded much more slowly in the change of materials than in the change of motive power. At a time when English owners and builders had largely adopted iron, Americans absolutely refused to have anything to do with it. In 1853 the English built twenty-five per cent of their tonnage of iron, and in 1855 the proportion had risen to thirty-three per cent. In 1870 eighty-two per cent of the tonnage built was of iron, and wooden vessels were practically a thing of the past. During the last few years they may be said to have been discarded altogether, the exact figures in 1891 showing ninety-eight and seven tenths per cent of iron or steel and one and three tenths per cent of wood, and the vessels composing this infinitesimal part are of fifty tons or thereabouts.

The early statistics of iron shipbuilding in the United States have never been fully compiled. The tables of the Bureau of Navigation in the Treasury Department begin in 1869, with an iron tonnage built of 4,584 tons out of a total tonnage built of 275,230 tons, or one and six tenths per cent. We know that iron vessels were built before this date in this country, several. in fact, before the war, but they were isolated cases, and probably in no previous year was the proportion as great as at the time when the records begin. In 1870 this proportion was three per cent, as against eighty-two per cent in England. In 1880 it had risen to fifteen per cent, and was beginning to be perceptible. During the last ten years it has shown a steady increase, until in 1891 twenty-

nine per cent of our tonnage built is of iron or steel, and seventy-one per cent of wood.

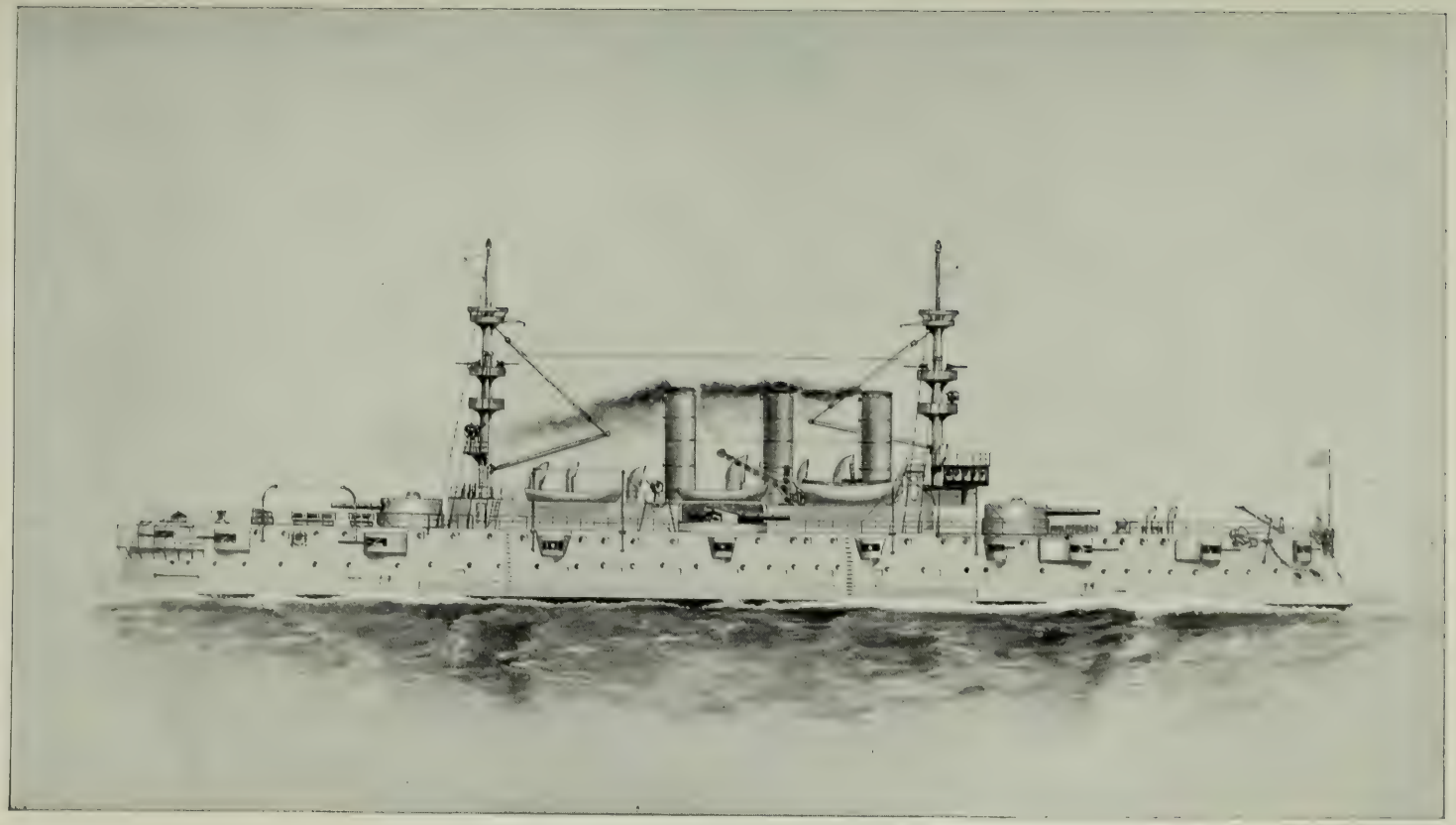
Although we have made a considerable advance in the materials of construction, which is destined to be still more marked in the coming years, it is not likely that we shall ever adopt the English practice to the extent of discarding wood altogether. The conditions here are such that for some purposes it will always be a favorite material; and while it is evident from the figures that it is rapidly falling into the background, wooden shipbuilding will not, as in England, disappear altogether from view.

No less remarkable than the transition from wood to iron has been the further transition from iron to steel. Steel first became an important factor in English shipbuilding in 1879, when it was used in the construction of 21,054 tons of shipping, or six per cent of the whole tonnage built, as against eighty-eight per cent of iron and six per cent of wood. At this date, therefore, the rising steel and the declining wood were just on a level. Ten years later steel had driven out not only wood but iron, the proportion of the three materials in tonnage built in 1891 being ninety-five and three tenths per cent of steel, three and four tenths per cent of iron, and one and three tenths per cent of wood. The figures of the last three years give no indications of any disposition to return to iron, the iron tonnage built having fallen steadily from 50,000 tons in 1889, to 45,000 in 1890, and to 22,500 in 1891.

In the United States steel is also advancing, although its advance is principally confined to the Great Lakes. In 1891, out of a total gross tonnage built of 269,302 tons, seventy-one per cent was of wood, eleven per cent of iron, and eighteen per cent of steel. Of the steel tonnage, however, more than five sixths is built on the lakes, and of the iron tonnage nearly nine tenths is built on the seaboard. Of the two metals, therefore, the owners of ocean vessels undoubtedly prefer iron, and the owners of lake vessels steel. All the iron and steel vessels are steamers. We build also a large number of wooden steamers (80,000 gross tons in 1891), but we build no iron or steel sailing vessels, while England is building no wooden steamers at all,* but in 1891 built 193,000 net tons of iron and steel sailing vessels.

During the last few years great progress has been made in the

* The figure of 1891 (563 tons) counts as nothing, and the vessels it represents average not more than 25 tons each.



United States steamer New York. Armored cruiser.

business of iron and steel ship and engine building in the United States. In the ten years from 1872 to 1881 we built 800,000 tons of steamers; from 1882–'91 we built 1,200,000. From 1872–'81 we built 224,000 tons of steel and iron; from 1882–'91 we built 485,000. In the first case the amount is half as large again; in the second, more than double. Shipbuilding plants have improved, and workmen skilled in the trade have increased greatly in number, both on the lakes and on the seaboard. The main advantage of steel over iron is its greater strength for a given weight, in consequence of which the steel ship may be built of the required strength much more lightly than an iron ship, and therefore have greater capacity for cargo. Steel has also a greater power of resisting abrasion. It is still looked upon as in some respects a treacherous metal compared with iron, especially in liability to chemical change in parts of the ship not easily accessible, and this consideration may possibly have had weight among builders and owners on the seaboard of the United States, although it evidently has little or no weight in England. The quality of manufactured steel has improved every year, and there is little doubt of its ultimate supremacy in the matter of shipbuilding. In our new warships, which form by far the most important feature of American shipbuilding, up to the present time steel has been exclusively adopted, and experience thus far goes to show that no mistake was made in using it.

The figures given above do not include the naval shipping of the past ten years. The influence of the reconstruction of the navy on the shipbuilding industry in America during this period has been incalculable. The total amount constructed (180,000 tons) is considerable regarded merely as an amount, but it is not only in quantity but in quality that this influence has been marked. The specifications and inspection of our new naval vessels have exacted a quality of workmanship and finish hitherto unknown in this country, and unsurpassed in any country in the world. The work has employed steadily 50,000 skilled mechanics in all the branches, not only of steel shipbuilding, but of subsidiary manufacture. It has led to a large increase of existing plants from Maine to Virginia on the Atlantic coast, and also on the Pacific. Some of the establishments concerned have more than doubled their capacity; others, such as that of Mr. C. P. Huntington, at Newport News, which is one of the best equipped in the world, and the Sparrow Point Works in Baltimore, have been founded, and although these have as yet taken no part in Government work, its influence is

manifest in their creation. Another most interesting fact connected with this development is the establishment of steel shipbuilding yards in Maine, the great stronghold of wooden shipbuilding in America. No city in the United States has built more wooden ships than Bath, yet even at Bath the spirit of progress has made itself felt, and the Bath Iron Works, under the enterprising and skillful direction of General T. W. Hyde, have now a complete plant, and are capable of turning out the best class of work. The establishment of the Union Iron Works at San Francisco, under the management of the Scotts, has given the Pacific coast a shipyard that in quality and finish of work is fully equal to that of the best builders on the Atlantic coast. A wide and far-reaching result has also been accomplished by the policy of the Navy Department, adopted first in 1878, of sending each year several of the most promising graduates of the Naval Academy to study marine architecture at the best schools of Europe. More than twenty accomplished constructors have been educated in this way, and their professional attainments will in the years to come exert a great and growing influence upon American shipbuilding.*

2. *The Cost of Shipbuilding.*—The consideration of the question of iron or steel brings us to the question of cost. Down to 1855 the United States was the country of cheap ships. At this date the iron steamer became the prevailing type of marine architecture, and the as yet undeveloped condition of our iron industry, in respect to natural resources as well as manufacturing skill, made the new type of ship a costly article. Nevertheless, we could and did build successfully iron steamers in this period, notably in Boston, and but for a combination of unfavorable circumstances, the new industry might have become firmly established. But the conservatism with which our owners adhered to the old type, the large number of persons employed in its manufacture, the excessive building of the previous ten years, which had glutted the market, and finally the war, with its interruption of business, and its tax upon every article except lumber, whether domestic or imported, entering into the construction and equipment of vessels, combined to retard the development of iron shipbuilding; while the demands of internal growth after the war drew capital away

* To show how direct this influence is, it may be mentioned that two of these constructors are now superintendents of construction at two of the oldest shipyards on the Atlantic coast.

from a field already much curtailed, during the period of interruption, by foreign competition.

For these reasons iron shipbuilding was a plant of slow growth between 1860 and 1880. The builders were few in number, and their shops and output relatively small. A shipbuilding industry whose orders did not average 20,000 tons a year did business on a much closer margin of profits than one which, as in England, disposed of 300,000 tons a year in the home market alone. The cost of material was still high. Even pig iron, which is now (1892) about $16 per ton, between 1866 and 1873 ranged from $33 to $46; while bar iron, which is now about $40 per ton, cost from $86 to $98; and steel rails, now $30 per ton, cost from $120 to $160. Other forms of manufactured iron were proportionately expensive. It is therefore not surprising that such American capitalists as cared to put money into ships at all preferred for the most part wooden vessels.

In so far as the tariff created an additional burden on steel ship-building by taxing materials when imported, the burden has now been completely removed by the Act of 1890, by which the duty on such materials was abolished. This action has no doubt been of some assistance, but a far more important factor lies in the increased production and consequent cheapness of iron and steel, in the increased volume of business, in the establishment of improved plants, and the gradual development of a large number of skilled workmen. As far as materials are concerned, it may be stated to-day that the difference in the first cost of ships between America and England has diminished practically to nothing. The great element of difference that still remains is in the cost of labor. It is true that the adoption each year of additional and improved labor-saving devices in machinery tends to render this difference a smaller factor. It is a general opinion, also, and no doubt a correct one, that American artisans accomplish more work in a given time than their foreign competitors, and therefore that their labor is more productive; but this can hardly counterbalance the great difference in the rate of wages. The question of the comparative cost of American and foreign shipbuilding, therefore, reduces itself purely to a question of the comparative cost of labor.

An admirably written article on the first cost of ships, recently published by Mr. Charles H. Cramp in the North American Review, throws some light upon the subject, though not so much as could be desired, in view of the great experience and business

knowledge of this distinguished shipbuilder. Mr. Cramp is of the opinion that the simple question, "Can we build a ship as cheaply in the United States as in England?" is impossible of direct positive or negative answer. In explanation of this statement he says:

"With regard to the simpler and plainer types of vessels, such as are used for freighting mainly, it is not worth while to discuss them here. The question solves itself to any one of average intelligence who will go aboard and compare the workmanship, style, finish, and general range of seaboat qualities as between any freight vessel, like those of the Metropolitan Line or the Morgan Line or the Clyde Line, for example, and the usual English tramp of approximately equal burden.

"Put the plans and specifications of the average English tramp in the hands of an American shipbuilder, and he could not duplicate her. He would build a better vessel, of superior workmanship and neater finish in every respect; for the reason, to put it broadly, that the mechanics who make up an American shipyard organization are trained to a grade of performance which they could not reduce to the standard of tramp construction.

"Under these circumstances, this branch of the subject may be dismissed summarily with the statement that an English freight ship of the usual type could not be duplicated in this country at any cost."

It is much to be regretted that a paper which gave so much promise of enlightenment upon a question so vital as the first cost of ships should dispose thus summarily of that branch of the subject which has most practical interest and bearing. It may be admitted that the "usual English tramp" is a vessel of such inferior qualities that no American shipbuilder would turn one out, but that is not the real question. In the half million net tonnage of new steel shipping built in England yearly, for English use, there are a great number of vessels of excellent qualities in every respect, in which any shipbuilder anywhere in the world might take pride, and whose employment is a source of large commercial profit to their owners. The question is, whether such ships of a high grade, both of materials and workmanship, the object of a great commercial demand and the source of a great commercial profit, or their equivalent in structural strength, speed, capacity, seaworthiness, and other elements of efficiency, can be built as cheaply in America as in England; and if not, what is the percentage of difference.

Coming to the highest class of vessels—which, however, comprises a very small part of the whole—Mr. Cramp is less reticent. The ships he mentions are the Columbia, the Paris and New York, the Teutonic and the Majestic. The question whether these great transatlantic liners can be duplicated by American shipbuilders at the same price he also passes over, for the reason that there is so much that is individual and personal to the builder in each of these structures that nobody but the builder could duplicate them at any price. But to the final question, whether American builders can construct a ship to do the work of the New York or the Majestic or the Columbia—and he would now presumbly add the Campania—in all respects for the same cost, he gives unhesitatingly an affirmative answer.

It is certainly a great step in advance for American shipbuilding to be able to turn out the highest type of ocean greyhounds, the equals of their English rivals in every respect, at substantially the same cost. Vessels of this type, however, though they represent the highest development of the merchant marine, are exceedingly limited in numbers, and form but a small proportion of the tonnage which earns annually hundreds of millions of dollars in the carrying trade of the world. It is not by the construction of these vessels alone that American shipping will reach its full development, and the old percentage of the carrying trade entering its ports be restored to the American flag. They are like the generals in an army; what we need are the rank and file. There are scores of shipowners in England employing fleets numbering from half a dozen to fifty vessels of from 1,500 to 4,000 tons each, some of which are no doubt tramps of inferior construction, but a large number of which are admirable specimens of marine architecture as well as great freight-earners. If our builders can secure the same results for the same cost in the larger types, why should they not secure the same results for approximately the same cost in the smaller?

Whatever inference we are justified in drawing from the above-quoted statement, one fact is clear: that, whether from increased demand or from improved plants, or cheapened materials, or greater experience, the cost of ships in America has approached much more closely to the cost of ships in England than ever before, and whatever difference now remains is a difference in labor. Whether the resulting disparity, after all elements have been taken into account, is too great to enable us to compete on fairly equal terms with England, is a question. But no friend of Ameri-

TABLE I.—*Rates of Monthly Wages at Home Ports.*

COUNTRIES.	MATE.		SECOND MATE.		SEAMAN.		ORDINARY SEAMAN.	
	Monthly pay.	Less than U. S.	Monthly pay.	Less than U. S.	Monthly pay.	Less than U. S.	Monthly pay.	Less than U. S.
		Per cent.		*Per cent.*		*Per cent.*		*Per cent.*
Norway and Sweden	$17 02 to $19 46	63	.....	..	$9 73 to $10 94	45	$7 29	46
Russia	17 51 to 19 46	63	$11 67 to $15 56	58	9 73 to 11 67	43	7 29 to $7 28	46
Germany	17 85 to 20 23	62	13 00 to 15 47	56	9 54 to 10 71	45	5 95 to 7 14	..
Denmark	17 99	64	.....	..	10 94	43	8 51	37
Austria	.....	..	.....	..	10 70 to 11 19	43	9 73	27
Spain	43 75	12	34 06	..	13 62	27	11 19	17
Great Britain:								
Sails	38 92	22	21 89	37	12 16 to 13 38	32 to 33	7 29 to 9 73	37
Steam, Atlantic voyages	55 91 to 66 08	..	46 18 to 58 34	..	19 46	..	.....	..
Other steam voyages	38 93	..	29 19	..	14 59	..	.....	..
United States:								
Pacific	50 00	..	35 00	..	20 00	..	15 00	..
Atlantic	50 00	..	30 00 to 35 00	..	18 00	..	12 00	..

can labor, however much he may be bewildered by the enormous figures represented by the gross earnings of the carrying trade, would wish to secure a portion of these earnings by the complete sacrifice of the labor interest involved in shipbuilding. Only the figures of the next few years will show us where we stand in this matter, and certainly the indications of the last few months present marked features of encouragement.

3. *Cost of running Ships.*—Not only are we handicapped in the development of our merchant marine by the difference in the first cost of ships, but we are likewise handicapped in the cost of running them. Here, again, the difference is a difference in labor. The other questions, relating to supplies, repairs, etc., are not of any great moment in the calculation, and need not be considered here.

The subjoined tables, prepared in 1887, by Charles T. Russell, Esq., United States consul at Liverpool, and published in Consular Reports, Department of State, No. 89, February, 1888, give a comparative statement of the scale of wages and maintenance in

merchant vessels of the United States and foreign countries:

TABLE II.—*Comparative Cost of Maintenance per Man per Day.*

COUNTRIES.	Cost of maintenance.	Less than U. S.
	Cents.	*Per cent.*
Norway and Sweden	22 to 24	42
Russia	28	30
Germany	36	10
Denmark	23 to 27	37
Austria	24 to 36	40
Spain	30	40
Great Britain	22 to 36	27
United States	40	..

From the above tables it will be seen that the rate of wages in English transatlantic steam service is considerably higher than our general rate. On other English steamers the rate falls perceptibly below the American standard. Next comes Spain, whose rate is from twelve to twenty-seven per cent lower than our own. English sailing vessels have the next point in the scale. In the other countries the rates are little more than half of ours.

The cost of maintenance approaches our standard only in the German service. In all other nations it is much lower, the figures varying from twenty-seven to forty-two per cent less. This is entirely due to the superior quantity and quality of the food furnished to seamen in American ships, for whatever difference there may be in the cost of provisions is in our favor.

In the early period, before 1856, our seamen, as is the case now, received higher wages than those of other countries, and they were worth more to their employers. One marked reason for our success in that period was the superior knowledge of their business possessed by American seamen. This, of course, applies to the officers as well as the men, perhaps in a greater degree than to the men. In the ships of that day the American seamen had no superiors in the world. Their personal qualities were an essential element in our success. They actually drew business. Not only that, but when the business came they did it in such a way that it was a source of large profit to their employers. They handled the best class of freights because they were the best men to handle them. In consequence, the higher rate of wages did not interfere with our maritime development.

There is no reason why the same results should not follow in the future. It is true that our registered merchant marine has

lost to a great extent its best trade in the quality of freights, and it carries on now in its obsolete vessels a cheaper grade of business. It is true, also, that in the last thirty years of decline many of the old type of seamen, both officers and men, have disappeared, and new ones of the same quality have not come forward to take their place. But if shipping should revive on a new and modern footing and again compete for the old business, there is little reason to doubt that it would get it if it had ships of the right kind, and it would soon draw to it the same class of men that furnished the crews in the earlier period. With such a business as we might then reasonably expect, the wages question would not materially affect the problem of competition, especially with our principal foreign rival.

This is further illustrated by the table which has been given above in comparing the rates in England with those of other European countries. England pays the highest wages of any country in Europe, and it gets by far the most business. It achieves this result partly because it has better men. It is said that over four hundred tons of freight per man are carried every year by English ships, while only eighty-five tons per man are carried by Italian ships; the work done by an English seaman, therefore, is nearly five times as great as that done by an Italian seaman, and if he gets a rate of wages five times higher it would not affect the question of competition.

It is certainly to be hoped that a renewal of American shipping business will take place only on a basis of a continuance of the high rate of wages now given; we do not want to see it revived upon any other conditions. The industries of America must be developed, but not at the expense of the wage-earner; nor is there any likelihood that a restoration of our merchant marine will see any diminution in this respect of the benefits which it confers upon the laboring element.

4. *Comparative Inducements for the Employment of Capital.*—The shipping business has suffered by competition with England, but it has suffered far more by competition with other business in America. The internal development of the United States, with an area of 3,025,600 square miles, has taken place almost wholly within the last forty years, a period coextensive with the decline of our merchant shipping. During this period the objects presented for the employment of capital at highly remunerative rates of interest have been many and various. The mileage of our railroads in 1850 was 9,021; in 1891 it was 171,048. This develop-

United States steamer Miantonomoh. Monitor.

ment has absorbed enormous amounts of capital, the cost of construction alone being estimated at $10,000,000,000. The yield of this investment in interest and dividends is about $300,000,000 per annum. The development of land for agricultural purposes, whether on a large or a small scale, has called for a sum which has never been estimated, but which can readily be seen to have been enormous. To these must be added the amounts invested in canal and river transportation, in the development of mines, in the support of manufactures, and in the improvement of real estate in innumerable towns, many of which have grown up in the last twenty years out of nothing, and in the large cities of older but still recent growth, of which the foremost example is Chicago, where fifty miles of frontage are built annually. The vast sums of money thus invested have given returns in many cases not ten per cent but one hundred per cent greater than any which could be derived from ocean traffic. All these causes have contributed to keep the rate of interest high, and the nature of the enterprises is such that they have attracted precisely that adventurous spirit in the community which is required for engaging in maritime commerce. In England, on the other hand, the country had already reached at this period a high state of development, and its area was small; capital was abundant; home investments absorbed a small part of it, and the rate of interest was low. It is hardly a matter of surprise, therefore, that under these circumstances competition should have been all on one side. One great reason why we did not develop the carrying trade was because our capitalists had something better to do with their money.

In some exceptional cases American capital has been invested in ocean traffic by acquiring the ownership of the stock, wholly or in part, of foreign steamship companies, and by this means a certain share of the profits of the carrying trade, although prosecuted under a foreign flag, has returned to the United States. In some cases American lines have chartered English steamers to eke out their fleets, in others they have been actual owners of foreign vessels registered abroad under the name of a nominal owner. The limited extent to which these complicated devices are employed shows that they do not constitute a satisfactory method of doing business.

Each of the two opposite schools of political economists offers a broad and general remedy for the evils of our condition—one in bounties, the other in free ships; and each believes that his spe-

cific doctrine will restore prosperity to both the shipowner and the builder.

As to the first of these remedies, where it takes the form of a compensation for mail service no objection can be made to it. It is an equivalent for service actually rendered, and the compensation should be fixed upon a liberal basis. Nor is the premium paid to the owners of certain English vessels of a high class, for a Government option on their sale or hire in case of war, anything more than a reasonable *quid pro quo*. But the system of bounties pure and simple upon tons built or miles navigated, such as the French and some other continental states have adopted, stands on a different footing, and can produce only a temporary and limited benefit, to say nothing of its insuperable vices as an economic system.

The advocates of free ships, on the other hand, hold that if the law requiring American vessels to be of American build were repealed—in other words, if Americans were free to buy their ships in England—we should immediately resume our place among the foremost shipowners of the world; and, further, that this result would be accomplished without any injury to our shipbuilding interests. In this rapid development of American shipping our builders would not lose, because they would probably get some orders, especially for vessels for coastwise trade, and they would derive further benefit from the repairs of the newly created fleet.

In reference to the above argument, it may doubtless be admitted that the large proportion of the profits of the carrying trade which is now taken up by foreign ships, amounting to from $150,000,000 to $170,000,000 a year, would be reduced by the adoption of free ships. What advance we should make upon present figures it is impossible to estimate. The gains would be gradual; they would not come all at once. But how these gains would benefit the shipbuilders it is difficult to say. The shipbuilders themselves are pretty good judges of what is for their own interest, and they are emphatic in their denial of this proposition.

It would not take long to estimate what would be the value of the plant of American shipbuilders if foreign-built ships under the present conditions of labor were freely and universally admitted to American registry. The only builders who could maintain themselves under such circumstances would be the largest concerns, with unlimited capital behind them, who might find

compensation for the admission of foreign rivals in the destruction of those in America. It is not to be supposed, however, that any of our great builders would allow himself to be so carried away by narrow views of self-interest as to engage in any such cutthroat policy. There may not be much sentiment in business, but even in business, and as a business principle, the maintenance of strong industries at home counts for much. The advocates of free ships contend that the increased demand would result in orders to American shipbuilders; but it is a fact that the capacity of English shipyards to-day is much more than sufficient for the needs of England and her foreign customers, and they have actually a large surplus stock on hand. Not only could they meet all the demands of the American market for ships without materially enlarging their present plant, but they could meet the first installment of this demand without doing much additional building. The first result of free ships would be the purchase by Americans of a quantity of the cheap tramp tonnage at all times for sale in England. Under such circumstances, so far from its being probable that American shipbuilders would get some of the business, the admission of foreign ships would simply take away what they now have. To suppose that our carrying trade would suddenly show an enormous increase, and that the repairs of the new fleet would support the American shipbuilder, is somewhat chimerical. Shipowners whose ships traded with Europe would have the same reasons for repairing them there as for constructing them there. In fact, they not infrequently repair them there now—as witness the case of the Ohio, which was repaired extensively a few years ago on the Clyde—and they would be still more likely to do so when the ships were built there. The only gain, therefore, that American builders would have to offset the loss of their present orders would be small ordinary repairs and the larger repairs of vessels that never voyaged to European ports. The loss to our builders would be not only in respect to vessels registered in the foreign trade, but also in respect to those employed in the coastwise trade; for if the foreign-built vessels were admitted to one, they must also be admitted to the other. It would be intolerable for American shipowners to put their capital into American vessels which they could only use on foreign voyages, and which were prohibited from carrying cargoes between domestic ports. Unless, therefore, the coastwise trade were opened to ships of English build, the adoption of free ships would be a delusive benefit to shipowners, and would have a very

limited effect upon the carrying trade of America. If, however, it were adopted, as it only could be adopted, to its fullest extent, so as to include coastwise as well as ocean navigation, there would be little or nothing left for American shipbuilders to count upon.

We can not disregard the interests of the shipbuilder any more than those of the shipowner; the two must be considered side by side. That free ships might have been a decided advantage in the carrying trade, and might have done little harm to iron shipbuilding in America, during the years from 1855 to 1870, is quite possible. In the latter part of this period, from two thirds to seven eighths of the total tonnage built annually in England was of iron, while iron shipbuilding in America was still almost an unknown art. But at the present time, when the industry has for the first time established itself in this country on a firm foundation, and is being developed in the most progressive and enterprising spirit, to admit all the well-equipped, long-established, and experienced shipyards of Great Britain into direct competition on equal terms would be to send it to an early grave. It is not denied that it is possible to go too far in fostering the interests of the shipbuilders at the expense of shipping, and in some things the builders may well make concessions. Nor is it denied that shipbuilding in America is tending toward such conditions that the builders—at least in iron and steel—will have little to fear from free ships; but no real benefit to the United States would be accomplished at this time by the adoption of a principle that would cut the ground from under their feet.

Allusion has been repeatedly made to the manner in which the opposing interests in England are combined and made to work together in a spirit of mutual concession and support. We have had recent examples of very direct combination by the union of the two forms of enterprise in what is practically the same body. In fact, it was not uncommon in the old days to see the same firm, as is the case with the Sewalls in Bath at the present time, both owners and builders. But, apart from these cases of actual partnership, recent legislation has sought and found, in one case at least, a basis of compromise whose general adoption would go far to relieve the present situation.

By an act of May 10, 1892, "to encourage American shipbuilding," the Treasury was authorized to grant registers as vessels of the United States to any foreign-built steamships sailing in an established freight and passenger line from a United States port, owned by foreign corporations, ninety per cent of whose stock

was the property of citizens of the United States. The vessels, to obtain the benefits of the act, must be of eight thousand tons and not less than twenty knots speed, and the condition of their admission to American registration was that the American owners of the majority interest should obtain a complete title, and that they should cause to be built in American shipyards steamships of equal aggregate tonnage, which should be not less than seven thousand tons each. Incidentally it was provided that these vessels might be taken by the United States Government as cruisers or transports upon payment to the owners of the fair actual value.

It will be noticed that this law provides for the admission to our registry of certain large and fast ships of the first class, already owned almost if not wholly in America, but of foreign build. So far, it is an application of the doctrine of free ships to a very circumscribed extent, and, from the narrow point of view, an injury to the shipbuilding interests; but it is further provided, as a condition of the admission of these ships, that an equal tonnage shall be built for the owners in America, and here the shipbuilders get not only their compensation, but a direct and positive advantage. As the act was passed, it was only applicable to two ships of the Inman Steamship Company, but the principle is one which might be generally adopted, and would be if the shipbuilding and shipowning interests would work together for the common advantage. In fact, a bill for the admission on similar terms of the China, an English-built vessel, owned by the Pacific Mail Steamship Company, barely failed to pass the last House. Such terms it will be well not only for the owners but for the shipbuilders to accept. The purchase and admission to American registry not alone of 20,000 but 50,000 or 100,000 tons of the highest class of steel steamships, not necessarily of the largest size, can not be regarded as harmful when coupled with an order for the building of a like amount in American shipyards. In this compromise—for it is nothing less than a compromise—is the most promising feature that has occurred for forty years in the history of American shipping. The American merchant marine has thereby secured the possession of two of the best ships afloat, the New York and the Paris; and the International Navigation Company, which owns these vessels, has already ordered, at Cramp's Works, five vessels, one of 8,000 tons and the other four of less size, to comply with the terms of its contract. The total addition made by this act to our registered tonnage is about 60,000 tons. The two nationalized ships hoisted the American flag for

the first time in February last. It may well be hoped that extreme partisans on one side or the other may not be induced by mere *doctrinaire* tendencies to sacrifice results for the sake of a dogma, and to oppose this happy adjustment of conflicting interests, because they can be satisfied with nothing between complete victory and total defeat. It is hard to understand the reasoning of an advocate of free ships who refuses to admit any because he can not admit all; and it is equally hard to understand that of an advocate of American building who cuts off from American builders the prospect of an increased demand. We believe that American ships should be built in American shipyards, but we believe that a measure that encourages American shipowning and thereby enlarges the demand for ships, while it stipulates that a certain proportion of orders shall go to American builders, is a benefit to both interests, which neither can afford to throw away.

War Marine.

No statement of the maritime industries of America would be complete without a brief account of the progress and development of naval construction in this country, which has had from the beginning a vast influence upon shipbuilding in general—an influence which, judging from recent events, is to increase rather than diminish in the future.

The first ships of the navy were built during the second administration of Washington. Fortunately, the work was placed in the hands of Joshua Humphreys, a Pennsylvania constructor of great skill and broad judgment. Humphreys established for all time the lines upon which American shipbuilding should be conducted. His only principle was, that American ships of war should be better in their respective classes than the best ships abroad. Upon this principle were constructed the early frigates —the Constitution, United States, Constellation, President, Congress, and Chesapeake—to whose qualities our success in the wars that followed was largely due.

The next great step in naval construction was the act of January 2, 1815, providing for the building of four line-of-battle ships of seventy-four guns each, and six forty-four-gun frigates. Among the vessels built under this act were the Independence, the Franklin, the Guerrière, and the Java.

In 1816 Congress undertook a comprehensive scheme of naval shipbuilding by the appropriation of a large sum of money annu-

ally for eight years, the ships to be built including both battle-ships and frigates. Some of these ancient ships, which were splendid specimens of the naval architecture of that period, have lasted to our own day. The Vermont and the New Hampshire, now at New York, are examples of the battle-ships; and the Santee, at Annapolis, of the frigates. Under an act of the previous year, authorizing the construction of a "floating battery," was built the first steam vessel of the navy, appropriately named the Fulton, and for a long time the only steamer in the service. During the next thirty years various vessels were built from time to time, all of them excellent of their kind, but all or nearly all wooden sailing vessels. It was not until 1839 that a decided departure was taken in the building of two side-wheel steamers, the Mississippi and Missouri. Even as late as 1846 the Government, influenced by the same conservatism that was shown by private shipowners, built a number of sailing sloops and brigs, of the first of which the Saratoga, the Portsmouth, the St. Mary's, and the Jamestown are the existing relics.

In 1847 the sailing ship was permanently laid aside in the navy. In that year four side-wheel steamers were begun—the Susquehanna, the Saranac, the Powhatan, and the San Jacinto. These vessels represented the extreme advance of naval achitecture of that period.

The building of steamers now advanced rapidly. The six screw frigates, built in 1854, were the pride of the navy and the wonder of professional men all over the world. These were the Merrimac, Minnesota, Wabash, Roanoke, Colorado, and Niagara, although the last named was not completed until some years afterward. In 1858 the screw sloops were authorized—a smaller class of vessels but equally efficient of their kind, and destined to become equally famous; these were the Lancaster, Hartford, Brooklyn, Pensacola and Richmond. A smaller class of sloops, of which the Wyoming, Mohican, and Iroquois were representatives, was begun in the following year.

Such was the progress of naval shipbuilding down to the time of the civil war. The demands of the war increased the fleet from ninety vessels to over seven hundred, and compelled the Government to take everything it could use. Many merchant vessels, though poorly adapted for war service, were converted into cruisers and blockaders, and the fleet was filled with craft of every known description, and of some descriptions until then wholly unknown, from the great broadside ironclad frigate New

Ironsides down to the nondescript vessels employed upon the Western rivers.

One type of vessel used in the war deserves especial mention. This was the Monitor, the creation of Ericsson's genius, a vessel well suited to its purpose, and destined to revolutionize the principles and practice of war-ship construction. Numbers of these ships were built, and the type underwent gradual development. Its essential features were a low freeboard, protected by an armor belt, and the disposition of the guns first in one and afterward in two armored turrets. Although certain features of the Monitor are now recognized as unsuitable for vessels intended to fight at sea, its main feature—two armored turrets, with nearly all-round fire—has been carried out in the most advanced types of modern war ships, and it may be truly said that the battle-ship of to-day is simply a development of Ericsson's original creation.

In the period of relaxation following the war little was done to keep up the fleet. The converted merchantmen were quickly disposed of; others, hastily built from inferior materials, proved to be useless; the older ships began to decay, and for the next twenty years a period of stagnation set in, only characterized by the gradual wearing out of the obsolete structures of which the fleet was composed.

The first movements in the direction of naval reconstruction were made in 1880 and 1881. After two years of agitation and discussion, a law was passed prohibiting the repairs of wooden ships in excess of thirty per cent of the first cost, which resulted in striking from the navy register of a large quantity of worthless material. Finally, the act of March 3, 1883, provided for the construction of four steel cruisers, under which were built the Chicago, Boston, Atlanta, and Dolphin.

In 1885 four additional steel cruisers were authorized; and from that time on to the present no session of Congress has passed without some contribution to the new naval fleet. Each year has seen the development of types representing an advance over those preceding, and the Navy Department has now, either completed or under construction, four first-class battle-ships of over 10,000 tons each, two armored cruisers of over 8,000 tons, and two protected cruisers of 7,500 tons. The intermediate vessels, coming between the first and the last groups, excelled their predecessors, and were in turn excelled by the later types.

The battle-ships, which include the Indiana, Massachusetts, Oregon, and Iowa, are the most powerful ships of any kind in the

world. They carry an enormous battery, which throws at a single fire three tons of projectiles. They are plated with heavy Harveyized armor of a quality far in advance of that hitherto used in Europe, and they have a full torpedo outfit, and suitable protection against an enemy's torpedoes. The latest of the four battle-ships, the Iowa, is fully the equal of her three predecessors in offensive and defensive qualities, while her greater displacement, amounting to 11,250 tons, permits the stowage of much larger quantities of coal, and increases proportionately the radius of action of the ship. She may be considered the highest development of naval architecture at the present day.

A second type of very high efficiency, that of the armored cruiser, is represented by the New York, of 8,100 tons, a ship less heavily armed and armored than the battle-ship, and yet strong in both of these respects; while a speed of twenty-one knots is sufficient to enable her to escape from any more powerful ship afloat, and to overtake the vast majority of all the ships of the world, either naval or mercantile. The New York was successfully launched a year ago, and is now ready to take her place in the new navy. She is built to keep the sea and to attack an enemy's commerce; and not only his commerce but any commerce-destroyer he may send out. She is thus both a commerce-protector and a commerce-destroyer of the highest efficiency. The Brooklyn is an enlarged and improved New York.

The third important type is represented by the swift, protected cruisers Columbia and Minneapolis, of 7,500 tons each, carrying a large armament of the lighter type of guns, completely protected against fire from such guns in an enemy's ship, and having a maximum speed that reaches the unparalleled figure of twenty-two knots; while their coal endurance is such that they can make the longest voyages likely to be required of any naval vessel without recoaling. They are the foremost specimens of the commerce-destroyer in existence; they are a match in strength and speed for the swiftest transatlantic liners afloat to-day, carrying any armament of which such a vessel is capable. No merchant vessel that they meet, armed or unarmed, can escape them. In these ships many novel devices have been applied, of which the most noticeable is to be found in their machinery, consisting of three sets of engines, driving three different screws, each of which may be used either separately or in conjunction with the others. The complete list of vessels of the new navy, now actually authorized and under construction, is as follows:

Armored Ships.

Name.	Tons.	Name.	Tons.
Iowa	11,250	Puritan	6,060
Indiana	10,200	Monterey	4,138
Massachusetts	10,200	Miantonomoh	3,990
Oregon	10,200	Amphitrite	3,990
Brooklyn	9,100	Monadnock	3,990
New York	8,100	Terror	3,990
Maine	6,648	Katahdin	2,183
Texas	6,300		

*Unarmored Ships.**

Columbia	7,350	Yorktown	1,700
Minneapolis	7,350	Concord	1,700
Olympia	5,500	Bennington	1,700
Baltimore	4,600	Dolphin	1,485
Chicago	4,500	Machias	1,050
Philadelphia	4,324	Castine	1,050
San Francisco	4,083	Vesuvius	930
Newark	4,083	Petrel	890
Charleston	4,040	Bancroft	838
Boston	3,189	Torpedo Boat No. 2	120
Atlanta	3,189	Cushing	114
Cincinnati	3,183	Wahneta	192
Raleigh	3,183	Iwana	192
Detroit	2,000	Narkeeta	192
Montgomery	2,000	Stiletto	31
Marblehead	2,000		

Of the ships in the above list, the design and construction of the Chicago, Boston, Atlanta, and Dolphin should properly be credited to the administration of Mr. Chandler, under whom the work of reconstruction was begun.

The principal ships of Mr. Whitney's administration were the armored ships Maine and Texas, the armored coast defender Monterey, the protected cruisers Baltimore, San Francisco, Charleston, Newark, and Philadelphia, the gunboats Yorktown, Concord, and Bennington, the dynamite gunboat Vesuvius, and a few others of less importance. This group is a distinct advance upon their predecessors.

The three main types of Mr. Tracy's administration comprise the four great battleships, the two armored cruisers, and the two protected cruisers of twenty-two knots, referred to above. Several smaller vessels are also included in this period, but by far the most important are the eight ships of these three classes. These

* Three additional gunboats were authorized at the second session of the Fifty-second Congress, but these have not yet been designed.

Beyond the Lightship, New York Harbor.

Steam yacht. Full-rigged ship. Pilot boat. Priscilla and Mayflower racing.

represent a new departure in warship construction. In every feature of naval efficiency they stand at the head, not only of ships of their type, but of warships of any type, at home or abroad; and they constitute the real strength of the navy as it is projected to-day.

It is the construction of this fleet of vessels, amounting altogether to 180,000 tons, that has given to steel shipbuilding a place among the foremost branches of manufacture in America, and to the United States a place among the foremost shipbuilding nations of the world. At the time the first ships were undertaken, neither our designers nor our constructors, private or public, had had any experience in the construction of steel ships. The Government requirements were intentionally placed high, as it was determined that the ships should be, as in the earlier period, the best of their kind in the world. No private customer ever called for such a quality, either of material or workmanship, as that which the Navy Department has exacted in its vessels. It was at first supposed that it would be impossible to comply with these requirements, but the result has amply justified the adoption of the standard set by the Navy Department. The programme has been carried out without any serious defects either in design or construction. Problems which the shipbuilder would never have grappled with under the stimulus of merely private enterprise, have been successfully met and overcome. The work in the private and public shipyards has trained, either in the construction of the ships themselves or in auxiliary branches of manufacture, over 50,000 skilled mechanics a year. The benefits of the work have been felt not only by the shipbuilders but by the foundries, the rolling mills, the manufacturers of steel castings, and of all other branches of work that go into the construction, arming, or equipment of a steel ship. New processes of manufacture have been established in America solely for this purpose, and immense sums have been spent for new and improved machinery. It is directly due to this development that American shipbuilders are now able to promise that they will turn out the most finished product in the world, and secure the same results that have been reached in the great transatlantic steamers at no greater price than that charged by their foreign rivals. The industry is now prepared to meet any demands that may be made on it; and if the wise principle of the Inman Line act, rightly named "A bill to encourage American shipbuilding," could be adopted as a general provision, we should soon have a fleet of merchant steamers,

flying the American flag and built in American shipyards, which, if not so numerous, would bear as good a name and yield as high a rate of profit as did that earlier fleet which, half a century ago, filled with American ships every highway of maritime commerce.

CHAPTER XI.

OUR MILITARY RESOURCES—HOW SHALL WE UTILIZE THEM?

We Americans are supposed to be a peaceful people, but our history demonstrates the contrary. From the time when our ancestors landed on the inhospitable New England shore and began the battle of civilization until the present generation, which has astonished the world with the magnitude of its armies and the tenacity of its battles, our history has been one of wars and rumors of wars. The conflicts with the Indians were an unavoidable sequence of the newcomers wresting from the aborigines room for a new home; but the rest of the colonial wars arose from pure British combativeness; and they called upon the sparse population for exertions unequaled, in view of the fact that the struggle for bare existence was already a serious demand upon their slender resources. Colonial history is one long recital of wars, to a curious extent without substantial cause or worthy result.

The Revolution was believed to have changed all that. Emerging from the struggle with all lost save liberty, an era of peace was entered upon which there was no predictable cause to interrupt. And yet the sequence of our quarrels since that day has been unbroken. We have had wars with England and Mexico, with Tripoli and Algiers; broils with Paraguay and Corea, and a gigantic civil war; rumors of wars with France, England, Spain, and Italy. We have had the John Brown raid, the Fenian raids to Canada, many incursions across the Mexican border, and the filibustering expeditions to Cuba and Nicaragua. We have had the Whisky and Shays's rebellions, the election, draft, railroad, reconstruction, and sundry serious city riots; the Homestead and Buffalo troubles; we have had well on to two hundred deadly Indian fights, accompanied by blood-curdling massacres. We have suffered more casualties in active war since the Revolution than any nation of Europe; during our entire history we have lost more men in proportion to our population. This record

sounds oddly enough when contrasted with the statements of the peace-at-any-price folks who claim for us the reputation of a cool-headed people which minds its own business, has no call for army or navy, and can dispense with coast defenses.

The ocean has so far in our history been no preventive of imbroglios with foreign nations. We have a national spirit of antagonism which is not apt to decrease. Our freedom of speech leads us into highly provocative moods. Our combativeness is bred in the bone; it is a true Anglo-Saxon characteristic. Diplomacy may not be guided by journalism, but it is often influenced by it, and editors are not as a class dispassionate. There is no lack of inflammable material in our national policy. The Monroe doctrine is capable of volcanic action. Patience is not a distinguishing American trait. It is certainly not probable that we shall be led into foreign complications; but such incidents as the New Orleans lynching in 1891, and the Chilian imbroglio of 1891–'92, bring us uncomfortably close to such a disaster. It needs no argument to show that no enemy could in the long run maintain a footing on American soil; but this is the age of speed in military matters as in every other field of action. It is the initial danger we have to dread—the damage we may suffer before we are prepared to defend ourselves. A nation whose preparations are complete can act at once. Rapid mobilization is the keynote of military security to-day, and mobilization presupposes a force to mobilize. It is no easy matter to prepare an armed force. To create a navy and coast defenses is a business of at least a dozen years. We have no regular army which can be concentrated in a body exceeding six or eight thousand men. It is spread over a huge territory, and every man is needed where he stands. To mobilize a suitable force of militia or volunteers consumes months; to bring the best of material from an utter ignorance of field duties into fighting trim is shown by our experience in the civil war to require at least a year. Meanwhile we have no means of resisting foreign aggression.

For twenty years succeeding the civil war there was at the call of the national Government, alike in North and South, a veteran material for volunteers rarely equaled in any country. But nearly thirty years have elapsed since that struggle was at its flood tide, and the youngest of the volunteers of 1861–'65 has long ago passed the age where his services in the ranks can be availed of. We have in America a population peerless in its value for supplying soldiers, for intelligence is to-day the most

important quality. No volunteer has, on the whole, quite reached the notch of efficiency which the American easily scored. But volunteers, to be of any value as soldiers, must undergo a certain period of training. Whenever American volunteers have passed through their probation, be it at the rendezvous or in the field, they have proved of the highest grade. This is not a matter of boasting; it is statistically proved. But without the probation the American volunteer is not much better than the militiaman, and the militiaman pure and simple has proved no more trustworthy in our history than in any other.

We have a right to be proud of our seasoned volunteers; not so of our militia, using that word in the constitutional sense. The war history of the one is a succession of noble services; the war history of the other is that of our military failures. And yet both come of precisely the same stock. The difference between them is simply the difference in discipline. The volunteer, so soon as he is mustered into the United States service, is subjected to the same course of education as the regular. The militia, called into the national service, is already supposed to be a disciplined body, but it has rarely had any training worthy the name. I am speaking of the militia contemplated by the Constitution, such as we understood the term up to the civil war. Since that day there has grown up a new body called the National Guard, or active or volunteer militia, which has very superior qualifications to the old "cornstalk militia." That this new militia in many of the States is better than anything we had in *ante-bellum* days can not be gainsaid; it could scarcely fail of being so, for it is now raised, organized, and disciplined in a much more rational manner than ever before, though by no means as yet in a manner to make it the homogeneous force the country needs. The influence of the war veterans on the volunteer militia has been marked. But even this militia is not, can not well be, an arm on which the Government can rely in case of sudden invasion. Militia has never proved efficient, and this National Guard will not be thoroughly so, under any organization which has as yet obtained. It needs but a superficial reading of our history to demonstrate this fact. The old militia in 1812 was opposed to forces not more its superior than the National Guard of to-day would be if mobilized to resist an invasion of some of the highly trained regular forces of any European nation. The exceptions when militia has been of some value only the more certainly prove the rule.

It is generally admitted that our national bulwarks—navy and

coast defenses—should be more carefully fostered. The corollary to this proposition ought to follow, that a national force—a *Landwehr*—should exist in this country, capable of being drawn on by the central Government, and of such quality of material, such degree of discipline, and such knowledge of our strategic and topographical conditions, as will enable it to hold head to foreign regulars should we ever be subjected to invasion. To speak of foreign regulars landing on our shores is wont to produce a smile of incredulity; but it must be remembered that we are very quick to provoke antagonism, and that England, France, and Italy have fleets which to-day could enter any one of our ports without difficulty, convoying the largest ocean greyhounds, which they can at any moment command, filled with armed men, and that other nations are only a trifle less well equipped; while on the other hand our coasts are naked of defenses and our navy is a thing of the future. A national reserve on our Atlantic seaboard is a matter of prime necessity, if we desire to be in a position to save ourselves from humiliation in some of our foreign imbroglios, not to mention loss many times greater than the cost of a respectable military establishment.

If, when other nations make demands upon us, we are willing to adopt the policy of settling the bill right or wrong, to stand and deliver whenever held up on the highway of foreign intercourse, we shall have no need of army or navy or of coast defenses. But such a course is too un-American, let alone too extravagant to be considered. We must be prepared to hold our own in defensive war as well as to assert our rights in diplomacy. That we shall adopt the *rôle* of invaders is not probable; and though our past history makes it by no means impossible, we hope to limit our use of armed forces to our own territory; still, we have been recently led to show an offensive intent toward Chili, and we may be called on to do the like elsewhere.

It is not a difficult problem to produce, without great cost, out of the present active militia of the States, a national reserve of one or two hundred thousand men, which shall be of good material, well trained, well armed, and quickly mobilized. Any difficulties which exist are purely political, practically imaginary.

There are something over nine millions of arms-bearing men of proper age in the United States. Such a calculation may, however, be disregarded. The old constitutional provision for organizing, arming, and disciplining the militia has for forty years been a dead letter. The National Guard of the several States,

Armory of the Seventy-first Regiment, New York, occupied March 31, 1894.

though but one hundred thousand strong to-day, gives us a much better basis of action.

In 1792 was passed the first congressional law for maintaining and drilling a militia. Every able-bodied man between eighteen and forty-five was to be enrolled in each State, and each man was to provide himself with arms and accouterments. The States were to distribute this self-armed body into brigades and divisions. Every one can readily imagine, some have heard from their grandsires, what a motley and unreal force this was, and how useless "the good musket or firelock, sufficient bayonet and belt, spare flints and knapsack" were. From the day of the first law down to the Mexican War this militia system obtained, but the force existing under it was a broken reed. Its utter impracticability gradually brought it into disrepute, and it had been, for years prior to our civil war, a thing of the past.

Under the Constitution, Congress has power to provide for the common defense of the United States; to declare war; to raise and support armies; to provide and maintain a navy; to make rules for the government and regulation of the land and naval forces; to provide for calling out the militia to execute the laws of the Union, suppress insurrections, and repel invasions; to provide for organizing, arming, and disciplining the militia. And the United States is holden to guarantee to every State in the Union a republican form of government; to protect each of them against invasion, and on application of the Legislature, or Executive when the Legislature is not in session, against domestic violence. But these powers are limited. Such action as is taken under the latter provisions falls on the army as the agent; and the army is hedged about by a network of laws and precedents. Some people conceive army officers to be meddlesome fellows, ready to thrust their thumb into every civil pie, and governed by neither rule nor reason. The reverse is true. The official authority of an officer of the army can not be exceeded without personal liability, not only to trial by court-martial but to civil suit for damages—a notable deterrent from exceeding his power. His authority can be derived solely from the President; and the President's rests solely on application from the States. The officer is bound hand and foot, as is no other citizen, by inflexible regulations. In a riot or other civil disturbance, for instance, he may, of his own motion, not even seek to produce a peaceful moral effect by parading his troops or making a show of standing on the side of law and order. And he is especially enjoined,

under serious penalties, to avoid any interference or show of interference with elections or at election time. Slight exceptions under the Civil Rights Bill and the laws relating to the Indians or the public health do not in reality extend the power of the army. Its authority as against a State is very strictly limited. Only in case of unlawful disturbances threatening Government property or of interference with the mails—in other words, matters solely within the province of the United States—can the army or any of its officers act independently, and then only when there is no time to seek instructions, and in any event at individual peril if a mistake of law or fact is made. In America a soldier ceases not to be a citizen, and his authority as a soldier is extremely small.

Such being the case, the undoubted existence of so strong a prejudice against a standing army, or anything akin to it, in America is hard to explain. We now have but one blue-coat for every one hundred and forty-four square miles of our territory. Still, such prejudice, born of British interference with the colonies, does, and it is well that it should, exist; for even the soldier with the keenest professional pride is first of all an American, and feels that too great an extension of the regular force is not advisable. While there is this feeling against a large regular establishment, there is on the other hand a growing favor exhibited toward the volunteer. In order to raise a sufficient national reserve, it is not necessary to combat the popular antagonism to the regulars, for the people have already taken the matter into their own hands, and have raised an active militia of no mean proportions or efficiency. It is but a question of inducing the State Legislatures to make the National Guard more homogeneous and available for larger and quicker work.

The association in late years of regulars and militia at the various annual encampments is fast eradicating the unreasonable prejudice against a standing force, if kept within limits. Such prejudice, which would be well enough against a force of the dimensions of those in Europe, is certainly baseless when harbored against our small army of twenty-five thousand men; for this is scarcely equal to the demands of the Indian problem, and it is essential as a leaven for our volunteer system.

The feeling is held by some that an army of any kind breeds quarrels. This is an error. It is the statesman's act which brings about war, the soldier's heroism and sacrifices which secure peace. The profession of arms, which, properly exercised, is the one that

in all ages has called out, and to-day evokes, the best qualities of a man's nature, is by many Americans looked upon askance. The army blue, which has covered the breasts of so many heroes, is in some sections a badge of ostracism. It was not so in the days when the regular army furnished our successful generals, when volunteers poured out from farm and factory to defend the Union. But that day is past, and now the professional soldier is given few words of cheer; the militiaman is looked at as one who periodically indulges in a picnic. It is this false sentiment which lies at the root of desertion in the regular army, which prevents the very best element from enlisting. It is only when serious danger threatens from turbulent crowds of the misled worst elements of the community, when the mere presence of a company or two of regulars suppresses a riot with which regiments of militia have failed successfully to cope, that the people for a moment express their respect for the professional soldier; and this is soon effaced by the well-worn antagonism to what in past ages has been the right arm of the tyrant. We forget that it was the same element which overturned his power. It is this false estimate which prevents some State Legislatures from giving more generous support to their National Guard. But, as before said, the idea is on the wane; every member of the National Guard who has been in camp with regulars has found out the value of our small army, and applies at home the best corrective to the prevailing misconception.

There still lurks in some parts of the country a feeling that in times of peace an army is not essential; that when the danger is at our doors it is time to organize resistance. The rapid growth of the National Guard shows that this error, too, is on the wane among the intelligent. Thinking men see that the United States is no longer safe in these days of rapid war enginery and transportation, without a means equally rapid of mobilizing a force of reliable troops. In olden days time was more ample to prepare for war. To-day, within three weeks after a declaration of war several army corps of regular troops could be landed in any one of our harbors. Nothing but sound coast defenses, a suitable navy, and a strong national reserve can put us beyond danger. That such an invasion is in the highest degree improbable in no wise weakens the argument.

The impulse toward creating a national reserve should come from the people. The first step has already been taken by creating the active militia in the several States. The second step is,

to utilize the small regular army as a leaven to the lump of citizen soldiery. This step has also been taken by associating the regulars once a year with the National Guard. It remains to instruct the people so that every citizen may see the true value of both the volunteer militia and the regular army. Closer relations should be cultivated between army and people. So long as the belief in a half-trained militia as a sufficient means of meeting armed invasion remains even among a small minority of our voting population, so long shall we remain without adequate protection.

A large regular force is not advisable. Despite the feeling of some professional soldiers that the military security of the United States should reside in a regular army large enough to cope with any probable danger; though our meager army of twenty-five thousand men could undoubtedly be increased somewhat to the advantage of all, it remains true that our chief reliance as a people should not be placed on regulars. These have a manifest duty. In time of peace the army is to act as an educational body, by whose means a reserve can be kept in training; when war comes it is to bear the first brunt until such a force can be mobilized. Both these are important *rôles*. The second it may not be called on for many years to perform; the first it performs in a limited measure now, and should be given opportunity of performing with the utmost efficiency. At some of the recent encampments of the State militia a small regular force has been present with the best effect. At most encampments inspectors of the regular army have attended, and have been welcomed by all, and the justice of their criticisms has been accepted as frankly as the soundness of their advice has been acknowledged. Such working in unison should be fostered, for it is through the militia that the army can best make its value felt among the people.

There has on rare occasions been expressed by militia officers the feeling that they did not want the interference of regulars, either as inspection officers or as a pattern for imitation. The idea has prevailed in some quarters that the one would be hypercritical, and that the other would laugh at the shortcomings of the "holiday-soldier." This impression has always been dissipated when regulars and militia have actually come into contact. Perhaps the least critical of men is one who thoroughly knows his business and the difficulty of acquiring it. Your severe critic is always the half-instructed man. It is certain that the experiment of adding to a militia encampment a regular officer or two, or a regular company, has always succeeded to the entire satisfaction

of the militia, both officers and men. And the practice of sending a United States inspecting officer to the several State encampments to aid, by suggestion and demonstration, in perfecting drill and discipline, was adopted at the request of the State officials. It has not only been met with alacrity by the State authorities, but has been productive of the greatest good. The reports of these officers, sent in to the War Department and thence distributed to the National Guard concerned, have been just and helpful. They are eagerly sought for as a basis for improvement.

Before the regular army can, however, act to the best advantage upon the State militia, it should itself be beyond criticism. Though, within the limitations prescribed by a Congress which never ceases from tinkering our much-enduring regular establishment, the army is of a very high grade, there are weak points which it would be of eventual economy to amend. In the matter of the training of officers, it is universally admitted, abroad and at home, that the Military Academy at West Point is without a superior. Putting national characteristics into the scale and the physical requirements, it may be fairly said that, at graduation, there leaves no educational institution in the world so fine a body of young men as are those who are sent out annually from West Point. Those who do not remain in the service go back into the people, with a marked capacity to influence the military status of their several States. It would be well that the capacity of West Point should be increased, and that there should be sent out each year some score of well-educated, perfectly trained young officers, who, returning directly to the people, could impress upon the State volunteers the stamp of our Military Academy. That these young men would do so is certain, and that the graduates of West Point never forget their early training was abundantly demonstrated during our civil war.

In the matter of ex-noncommissioned officers, the advantage of having many of these interspersed among the ranks of the volunteers is unquestionable. Every old soldier who stands in the volunteer ranks strengthens the line. To-day the pay of our United States soldiers is insufficient; the pay of our noncommissioned officers is absurdly so compared with the rate of wages in the market. The status of an enlisted man in the United States Army should be made one to be proud of. This is most quickly and efficiently done by raising the pay and allowances to a point where the very best element would be glad to enlist, and one which would enable recruiting officers to reject all but men of

the best character as well as of the requisite physical grade. If our military establishment is small, it should be perfect. Two million dollars added each year to the budget for the purpose of raising the grade of the rank and file of the army to the highest standard by pay which is worthy the class sought for, and of properly remunerating the noncommissioned officers, would be twice recouped in the saving of desertion with its accompanying vast disbursements in arresting, trying, and punishing the delinquents. And to discharge such men as this better class would become after one or two terms of enlistment and send them back to their several States, there to train, drill, and discipline the militia element, would be of a benefit far beyond the outlay.

So far, since the war, the influence of the old volunteer officers upon the State forces has been strongly felt; it is they, in fact, who have been the creators of the fine bodies of volunteer militia now in many of our States. But none of these men will outlast two more decades; few will carry their utility forward to the twentieth century. How are we to replace them except in the manner above suggested? They have begun the good work, not the least of the benefits of our civil war. To carry it forward is a just tribute to their intelligence and farsightedness. Without them, or some one to follow them, their work will not live.

Let us see what forces we have at our command to mold into an effective national reserve. The following table is from the latest procurable returns from the several States as reported to the War Department. These organized men are not the ancient enrolled militia which was supposed to arm and equip itself, but volunteers who seriously undertake to learn so much of a soldier's duties as the sparse time they can devote to the matter will enable them to compass, and who are armed and equipped by a congressional appropriation, and paid for their time by the several States.

Abstract of Men Available for Military Duty, and Organized Militia of the United States.

States.	Available for military duty.	Organized militia.	States.	Available for military duty.	Organized militia.
1. Alabama	160,000	2,958	10. Florida	48,000	1,021
2. Alaska	5,000	.....	11. Georgia	264,000	4,577
3. Arizona	7,200	293	12. Idaho	10,000	308
4. Arkansas	116,000	1,094	13. Illinois	550,000	4,389
5. California	153,000	4,218	14. Indian Territory	.....	.....
6. Colorado	85,000	825	15. Indiana	469,000	2,459
7. Columbia, Dist. of	42,000	1,418	16. Iowa	243,000	2,443
8. Connecticut	92,000	2,687	17. Kansas	250,000	1,738
9. Delaware	30,000	501	18. Kentucky	395,000	1,319

States.	Available for military duty.	Organized militia.	States.	Available for military duty.	Organized militia.
19. Louisiana	138,000	1,152	37. Oklahoma	5,000	.....
20. Maine	97,000	1,114	38. Oregon	40,000	1,506
21. Maryland	125,000	2,094	39. Pennsylvania	736,000	8,469
22. Massachusetts	340,000	5,511	40. Rhode Island	60,000	1,434
23. Michigan	400,000	2,515	41. South Carolina	200,000	5,616
24. Minnesota	200,000	1,838	42. South Dakota	60,000	526
25. Mississippi	233,000	1,712	43. Tennessee	290,000	1,357
26. Missouri	350,000	2,387	44. Texas	300,000	3,368
27. Montana	34,000	570	45. Utah	35,000	. ...
28. Nebraska	125,000	1,073	46. Vermont	44,000	786
29. Nevada	10,000	575	47. Virginia	220,000	2,844
30. New Hampshire	34,000	1,229	48. Washington	60,000	1,145
31. New Jersey	285,000	4,233	49. West Virginia	150,000	728
32. New Mexico	25,000	586	50. Wisconsin	309,000	2,737
33. New York	650,000	13,539	51. Wyoming	30,000	309
34. North Carolina	235,000	1,586			
35. North Dakota	36,000	513	Total	9,375,000	110,718
36. Ohio	600,000	5,373			

Here is a goodly total of troops which are largely drawn from the very best classes in the community, are uniformly anxious to learn, and are susceptible of a high grade of discipline and efficiency so soon as they are schooled. That they are stanch and loyal has been distinctly shown by their conduct during the recent Homestead riots and the Buffalo strike. As a rule, these organizations are spread abroad in each State, a company here and a company there, but on the lines of railway so as to be readily concentrated. In the more populous States only can they be assembled by regiments for instruction. Each company or regiment has its armory, where are kept the arms and equipments, and where more or less regular drills are had. The rent of these armories is generally defrayed by the State, in some localities by subscriptions among the members of the several organizations. Annual encampments by regiment, brigade, or division may now be said to be the rule, and here the troops have the advantage of learning more than mere manual drill and company movements. These encampments are usually for six days, from Sunday to Sunday. In some States, but rarely, they are longer, ten or even fourteen days. The term is not now long enough to make instruction become habit; and habit is the shibboleth of the soldier, whether it be the habit of drill or the habit of intelligent initiative.

Congress appropriates $400,000 a year for division among the States in ratio of population; and this sum is issued in stores, arms, and equipments; but no State is entitled to such issue unless it has

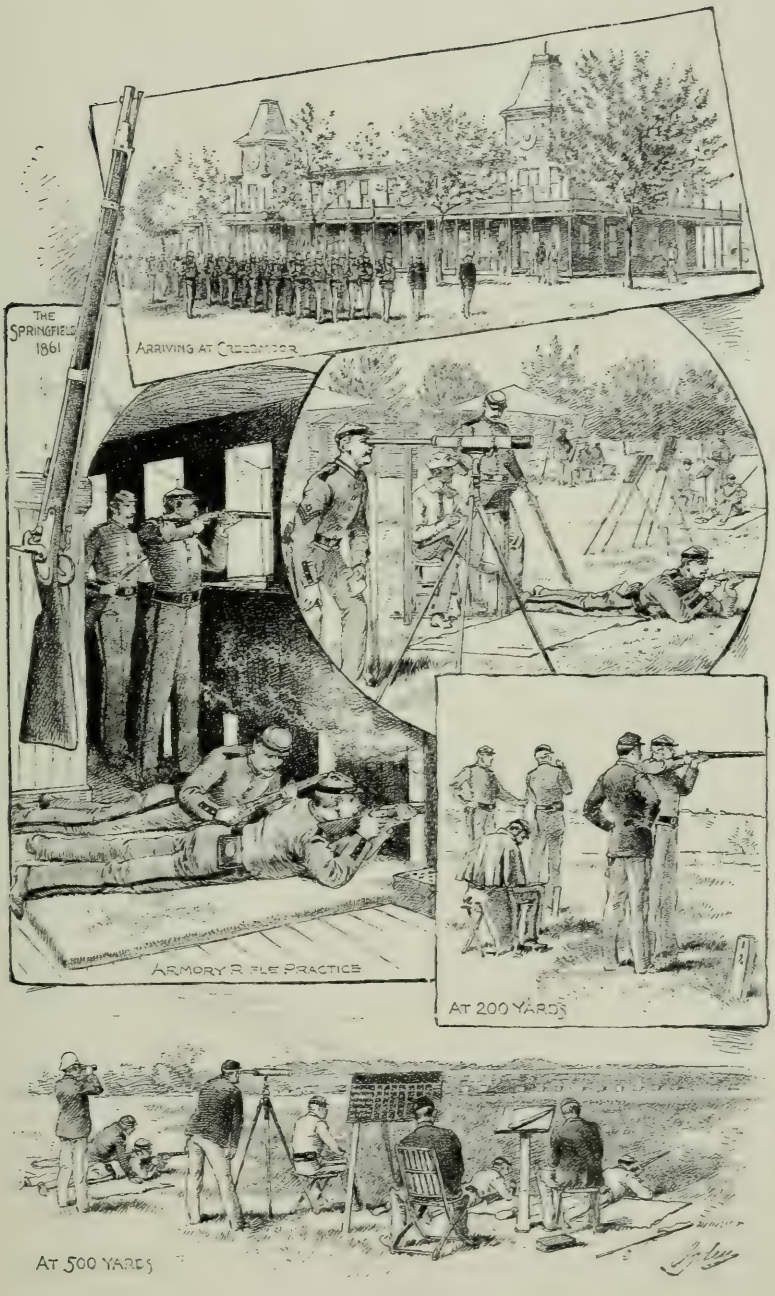
one hundred uniformed men for each congressional representative. The stores remain the property of the United States.

This National Guard is generally uniformed in the fatigue dress of the United States Army, though many organizations retain a full dress, which has become their pride from many years' association. It is gradually getting armed with the regulation Springfield rifle, and in accoutrements and in camp and garrison equipage is fast approaching the national standard. There naturally remains much room for criticism, but the body is on the way to become a serviceable army. At many of the annual encampments the inspections made by United States officers show a commendable condition of affairs, and all evince improvement. At each encampment there remains much to be done, but the various organizations are quick to accept, and in good part, the criticisms of the inspectors.

When it is remembered that to-day the first requisite of the soldier after bodily soundness is intelligence, we have every reason to expect excellent results from developing our militia thus organized. But it must also be borne in mind that it is intelligence coupled with at least one year's constant service in the ranks which is deemed essential to produce the modern soldier who shall not forget his training; and it is to this standard that we must aim. America should never be satisfied with less than the very best; but this may be obtained for our own purposes by other means than those of Europe.

It is not my purpose to institute any comparison between the active militia of the several States. In some it dates back a number of years and has been made extremely efficient, so that the National Guard of some of the States could to-day be relied on to do stanch work in case of war. In others it is of recent origin and leaves very much to be desired. The Legislatures of some of the States have been generous in their appropriations; in others these are lacking. Aside from the numbers enrolled, it is well to look at what is reported by the State officers as well as the inspecting officers of the United States Army. Though each inspector has his own point of view, so that we can not profitably compare the reported condition of the National Guard in the several States, their statements will give a fair general idea of the character of the force in each State. What follows is summarized from the reports of the State adjutants general, and from the reports of State officers and United States inspectors.

To take the States and Territories in alphabetical order:



Rifle practice.

Alabama has a force of twenty-nine hundred and fifty-eight men, in three regiments with thirty-five companies, two separate colored companies, three troops of cavalry, and four batteries of artillery, generally organized and equipped like United States troops. No brigade organization exists. Until 1891 the annual encampments had been by regiments. In 1891 all troops were brought together at Mobile. There was some opposition to this assembling of the forces. Zeal was apparent and instruction eagerly sought. Discipline was lacking. Guard duty was not understood; sentinels repeatedly left their post. Drills, parades, and reviews were excellent; guard mounting less good, showing lack of teaching. The manual was well executed. There exists much rivalry of the "prize-drill" era; each company wants to be a separate organization, not a part of one whole. The value of the larger body as a body is not appreciated. Stress is laid on the showy side, and the serious aspect of military life is neglected. The social element comes too much to the surface. This is well enough in the armory, but will not do in the annual encampment, where the individual must absolutely be merged into the soldier. The camp policing, done by hired men, was poor. The *personnel* of the troops is very high, but the setting up is poor. The rationing was excellent, but effected by a general mess; it would be better done by companies, so that the men might learn what they are to expect in the field.

Alaska has no organized militia.

Arizona.—There are ten companies authorized by law. Of these, there are enlisted nine companies of from thirty to thirty-five men each—two hundred and ninety-three men. The State is trying to organize a volunteer militia, but the Legislature has not so far done much to this end. The sum of three hundred and sixty dollars has been allowed to each company for expenses. There is no National Guard as a body.

Arkansas.—The office of adjutant general was abolished in 1879. Little has been done since; but a regiment is being organized, and one thousand and ninety-four men are reported. The State has its share of the United States appropriation. It is hoped that the coming years will see some serious work done.

California has forty-two hundred and eighteen men, in one division of two brigades, comprising eight regiments, two artillery companies, and one troop of cavalry. There is a naval battalion of four companies of ninety-two men each. The State spends seventy thousand dollars a year on the encampment. The mess-

ing is usually by companies, and is good. At the 1891 encampment the camp policing was satisfactory; not so the tent policing. The *personnel* of some regiments is composed largely of minors, and is not well set up. The arms and accoutrements are not all of United States pattern, and are illy cared for. Clothing is fair, but not well-fitting, and there is much lack of uniformity. Target practice is enthusiastically done, and shows some excellence. Battalion drill at the encampment was spirited but ragged. Some companies seemed well taught, others not at all. Brigade drill was naturally poor; brigade review excellent. Guard duty was with some regiments slouchy; better in others; all improved toward the close. Behavior was excellent; military courtesy much lacking. Too much familiarity existed between officers and men off duty. A sham battle was an excellent feature of the encampment. Some regiments were much higher in grade than others, one or two being of the very best. In most there was a decided improvement over previous years. The *personnel* varies. In some regiments it is exceptionally fine; in some the men are too young, and look weak. On the whole, the California National Guard is a body of excellent material and commendable discipline; if graded up to its best elements it would be equal to any. It could soon be made available for service.

Colorado has one brigade, comprising eleven companies of infantry, one battery of artillery, and two troops of cavalry, making a total of eight hundred and twenty-five men. Each company has an armory, and there is an annual encampment as well as target competition. The National Guard as a body has yet some improvement to make. The several organizations exhibit much interest in their work.

Columbia.—The District has an active militia of fourteen hundred and eighteen men, including a troop of cavalry and a battery of artillery. There are two regiments of twenty-three companies. The men are well taught and disciplined. The cavalry undertook a practice march last year to advantage; but the horses being hired, makes drill, which is occasional only, of questionable value. The troops have the presence of regulars to profit by, and seem to be a promising body of men.

Connecticut has a brigade of four regiments, two of ten and two of eight companies, two colored companies, and one battery of artillery; total, twenty-six hundred and eighty-seven men. Each regiment has a Gatling gun served by a platoon, a signal corps, a hospital corps, and a band. The State spends over one hundred

thousand dollars on its annual encampment. That of 1891 was at Niantic. The men are paid two dollars a day while on duty. Rations and forage are those of the United States regulations. The uniform is like that of the United States. The arms do not all conform to United States pattern. The messing was done by caterers, but not satisfactorily. The United States ration was issued and commuted at thirty cents. Camp policing was excellent; hospital service perfect. The Gatling guns were efficiently served and handled. The signal service, with bicycle messengers and scouts, was admirable. The artillery, considering that the horses are trained but seven times a year, was good. Roll-calls were fairly prompt; formations rapid. Guard duty was well done. From *reveillé* at 6 A. M. to end of brigade dress parade at 6 P. M. the men and officers worked continuously. Drills were good; skirmish drills commendable. Outpost duty was well taught; the colored troops were especially expert at it. Target-practice is had at other seasons. Inspection, at 8 A. M., showed exceptional cleanliness of tents and company streets. The men are anxious to learn, but do not sufficiently observe military courtesy. The noncommissioned officers do not insist on being saluted, as they should. On the whole, the brigade is such as in thirty days to be fit for field duty, and to do it well.

Delaware's volunteer force consists of a regiment of eight companies and one squadron of cavalry, five hundred and one men strong. The cost of its annual encampment is twelve thousand seven hundred dollars, and its share of the United States distribution of stores is received. The annual cost of maintaining its volunteers is twenty-two dollars and twenty-eight cents per man, against forty-three dollars and thirty-eight cents in Massachusetts; but the latter State is very liberal to its militia. The target practice of Delaware is good; its drills and guard duty fair. At the 1890 encampment there were fair skirmishing, problems of attack and defense, and some mob drill, to show the method of clearing streets. The discipline toward the end of the week became a trifle slack, as if the men had tired of restraint.

Florida has a force of fourteen hundred and sixty-four men authorized by law, in five four-company battalions. But so far only a force of one thousand and twenty-one men has been raised, including one battery. This is in three battalions, which are not given a regimental organization because of sparse population and local pride. The battalions are on the United States scale. At the encampment at St. Augustine, in 1891, the *personnel* showed

itself to be good, but the setting up was poor. The men objected to the initial drill. Camp administration was excellent; ambition to learn was apparent. Dress parade and guard mounting were well performed and with steady improvement. Drills were regular. Guard duty was cheerfully performed, but with mistakes of detail, showing lack of instruction. More time is needed on this. Subsistence was by companies on the commuted United States ration, and well done. Slight change would make this rationing admirable. Behavior was good; discipline fair; military courtesy scarcely fair. Arms were rusty and badly cared for, except in a few companies. A few years' encampments will presumably work a change for the better.

Georgia has four thousand five hundred and seventy-seven men, in four regiments of infantry, one regiment and one battalion of cavalry, two unattached companies of artillery, one of cavalry, and two of infantry, all white; three battalions of infantry, four unattached companies, and one unattached company each of cavalry and artillery, colored. The annual encampment costs twenty-five thousand dollars. An encampment of the cavalry regiment was held at Savannah in 1891. The material of the regiments is exceptionally good. The uniforms and horse equipments are not all alike. Carbines had not been issued to the troops. Drills improved as the days went on. Guard duty was weak; the men were intelligent, but had no training. Policing was excellent. Messing was by troops, on commutation of one dollar a day. Hospital service was good. Stables were well cared for. The horses are owned by the men and are mostly fine animals, and the men are good riders. All that is lacking to make a splendid regiment is uniformity and drill. Military courtesy was lacking. The infantry encampment was at Chickamauga, where a good camp had been constructed. Uniforms vary too much, the troops furnishing their own. Muskets vary somewhat; most are serviceable and in fair order. Accoutrements are of several kinds. Messing was good on seventy-five cents commutation. There was no target practice. Some companies drilled exceedingly well, others poorly. One or two of the regiments were reported as of a high order of merit; their dress parades good, guard duty excellent, and discipline high. The company drills and dress parades of other organizations were extremely good, but guard duty was weak and discipline slack. These matters improved much toward the end of the encampment. Skirmish drill was had on a large scale, and battle manœuvres were simulated. On

the whole, the material of the Georgia troops is exceptionally high; the drill and discipline of some of them are unsurpassed. With more time and patience the Georgia National Guard will rank with the best.

Idaho has a nucleus of three hundred and eight men. Small progress has as yet been made.

Illinois maintains a force of forty-three hundred and eighty-nine men, in two brigades comprising six regiments of twelve companies each, two batteries, and a troop of cavalry. The State spends fifty thousand dollars on its annual encampment, and sustains armories for the troops. Target practice is in vogue. Drill is fair; reviews and parades better because more practiced. Camp Lincoln is well policed, and much interest is exhibited by all concerned, though part of the cost of sustaining the regiments falls on the men. Guard duty is somewhat deficient. The ornamental overrides the necessary. Battalion drill is well executed considering the few occasions on which it is practiced. For brigade drill the men do not know enough. The cavalry stands well. A marked improvement was noticed in the encampment of 1891. The Illinois militia is a fine body, and growing in efficiency. The *personnel* is of high grade, though there are too frequent changes in it. Officers and men vie with each other to gain instruction and discipline. There should be more uniformity in teaching and in drill. The merely ornamental is steadily giving place to the useful, and this should be encouraged. The Illinois National Guard needs little to make it fit for active service.

Indiana's force is twenty-four hundred and fifty-nine strong, in three regiments and six separate companies, with four batteries of artillery. It draws sixty-eight hundred dollars in stores from the United States. The first military encampment was in 1889. The men then were zealous but uninstructed, and both officers and men seemed unfamiliar with their duties. But public interest is aroused, and there are signs of speedy and marked improvement. The encampment of 1891 was near Fort Wayne. The policing was good; discipline excellent; military courtesy more than commonly found in the militia. Arms were old but in good condition. Artillery work, considering the hired horses, was creditable. Drills were constant; parades excellent. Messing was plain but good; signaling and target practice satisfactory. Great interest is manifest on the part of all in bettering the militia. There is rapid improvement to note in the National Guard of Indiana.

Indian Territory has as yet organized no militia.

Iowa has a force of twenty-four hundred and forty-three men, in two brigades of three regiments of eight companies, each having forty-five men. Enlistments are for five years. The annual encampment is for five days. It costs thirty-five thousand dollars, and the State draws its stores from the United States. The allowances to the National Guard for pay, clothing, and rations are liberal. Target practice is rather crude. The Granger element is no friend to the military. The *personnel* is excellent, and anxious to learn. The troops are not all uniformed. The United States fatigue dress should be adopted; variety of uniform is objectionable. The improvement in the last encampment was unusually good. Ceremonies were well executed, but guard duty showed that the men had not been instructed in this important branch of the service. There is much room for gain, but there is a sincere desire on the part of all to make the National Guard an effective body.

Kansas maintains a force of seventeen hundred and thirty-eight men, in four regiments of eight companies each, and one battery. The men are mustered into service for five years. The appropriation for an annual encampment is irregular, but three hundred dollars is allowed each company for armory rent. On the whole, the force is well armed and uniformed.

Kentucky has three regiments, of eight companies each; total, thirteen hundred and nineteen men. An annual encampment was held in 1891. The policing of the camps was fair, and the company streets and tents were neat. The company kitchens were models. The uniform is substantially the United States fatigue suit, with some State trimmings. The condition of the arms was unsatisfactory, and accoutrements were not kept clean. Military courtesies were lacking. Roll-calls were prompt. The *personnel* is young, but excellent. Duty was well done, and zeal and intelligence were manifest. Company drills lasted two hours a day, and battalion drill took place if the weather was not too hot. Drill was fair; skirmish drill deficient. The manual was good, but more important matters were neglected. The artillery company, with three-inch guns and a Gatling, was proficient. Guard duty was irregular, but showed some improvement; instruction in this essential is needed. There was no target practice; the men were generally ignorant in the use of their weapon. Dress parade was fair. Messing was by company, and good. The men are not paid for their time in camp of instruction. The method of accountability is poor; eighty-seven thousand nine hundred

The Centennial Celebration, New York, 1889.

and twenty-four dollars have been expended in four years, with little to show for it. At instruction there were too many absentees, the officers not caring to study up for the classes. If regular encampments can be had, the condition of the Kentucky National Guard will sensibly improve, for the material is of the best. There is a strong martial spirit, but the proper military spirit, which inculcates subordination of the individual to the good of the whole body, is still lacking. Annual encampments will teach this.

Louisiana has an active militia of eleven hundred and fifty-two men, in one brigade. This consists of one battalion of five companies, one of four companies, two of three companies, four independent companies, one battery and three companies of artillery, and two companies of cavalry. Less has been done in Louisiana toward making this force a body of disciplined troops than in most other States. Isolated companies, however excellent as such, can not be considered as an effective military body.

Maine has a force of eleven hundred and fourteen men, in two regiments of eight companies and one gun company each, and one independent company. The regiments are not brigaded. At the 1891 encampment the camp policing was excellent, but there were no arrangements for bathing. Messing by companies was well done. Drill was four hours a day; instruction fair. Field officers were familiar with their work; not so the others. There was lack of uniformity in instruction, but all were alert and zealous, and improvement during the encampment was clear. On the whole, company and battalion drill were commendable. Target practice is not systematic. There are many good shots, many who have never fired a gun. Guard duty was weak, but the men appeared anxious to learn. Discipline was good, and salutes general; the behavior of the men exemplary. Dress was careless in many individuals. Uniforms are nearly like the United States regulation, and good. The armament is various, and arms were rusty. Camp equipage well cared for. Reviews were good. The State appropriates twenty thousand dollars; the United States issue is fifty-five hundred dollars.

Maryland has thirty-eight companies, viz., two regiments of ten companies each, three battalions of four companies each, three independent colored companies; total, two thousand and ninety-four men. The biennial ten days' encampment costs thirty thousand dollars, the appropriation being forty thousand dollars. Stores to the amount of seventy-five hundred and ninety-four dol-

lars are drawn from the United States. The officers are paid a per diem equal to the pay of United States officers; the enlisted men receive one dollar and thirty-three cents a day, with forty cents for subsistence. At the 1891 encampment the arms—Springfield rifle, caliber 45, of 1873—were fairly cared for. Uniforms partly United States regulation, but much worn; partly gray. Guard duty was poor at the start, but the men were zealous to improve; it was good at the close of ten days. Drills were good; target practice lacking. The medical department was excellent. The State appropriates forty thousand dollars a year. Messing was on a large scale, and excellent. Discipline was good. The colored companies are armed with various patterns of rifles; they have United States fatigue uniform, and their drill and discipline were good. On the whole, the Maryland National Guard ranks well.

Massachusetts has two brigades, comprising six regiments of infantry of twelve companies each, the two corps of cadets, one battalion of cavalry and one independent company, one battalion of artillery and one independent battery, a signal and ambulance corps, and a naval battalion, making a total of fifty-five hundred and eleven men. The total State expenses for the militia are from one hundred and fifty thousand to one hundred and ninety thousand dollars a year, and thirteen thousand dollars is drawn in kind from the United States. No better National Guard exists; few States have troops so well-taught. The policing of the camp at Framingham, in 1891, was reported excellent, but visitors were permitted to litter up the ground. Much zeal was shown by the troops, but military courtesy needed some improvement among the enlisted men. Discipline was good. Uniforms are the United States standard, and fit well. Arms appeared well cared for; equipments the like. Setting-up drill took place daily, as well as skirmish drill; the manual and marching were up to regular army standard. The artillery and cavalry were good, but hired horses prevent reaching perfection. The signal service was good. Target practice was excellent. Guard duty averaged well. Rations are included in the two dollars a day appropriated for the men. The First and Second Corps cadets are ideal organizations, with no superiors anywhere. The National Guard of Massachusetts has few equals in the United States; as a volunteer organization, no equal abroad. It can be ordered into active service as a division and do good work from the start.

Michigan has a force of twenty-five hundred and fifteen men, in

one brigade of four regiments, or forty companies. A tax of seventy-two thousand dollars sustains this militia. The annual encampment costs forty thousand dollars. The State draws twelve thousand dollars in United States stores. This body of men is excellent. Practice marches and the problems of attack and defense are made part of the annual drill, and the men are worked hard. Some parts of the drill are as good as in regular regiments. Skirmish drill has not been so well taught. The United States inspecting officer of 1891 reported the arms and equipments lacking in care, and that the elective system forbade the officers to exert sufficient severity to control the men—a trouble which is universal. Discipline could be improved somewhat. There is a canteen system. The food at mess was reported too rich and varied. The simpler United States ration is better. Battalion and brigade drill were creditable, and there was a marked interest in the work and decided improvement. Part of the expense falls on the men, which is a mistake. The Michigan National Guard is a more than creditable body.

Minnesota has three regiments of ten, nine, and eight companies, and two battalions of artillery, a total of eighteen hundred and thirty-eight men. The annual encampment is by regiments, and costs seventy thousand dollars; appropriation forty thousand dollars. The men receive one dollar and fifty cents a day, and seven dollars for rations, during the encampment. At the 1891 encampment discipline in camp was reported good, but salutes often lacking. Obedience was cheerful. Roll-calls were slack. Guard duty was, as usual, not well understood, but distinct improvement was made. The policing of camps was excellent. During the ten days there was a marked gain made. Drills were fairly good. Skirmish drill was tolerable only. Dress parades and reviews were excellent. Target practice showed proficiency. It is questionable whether the artillery is worth sustaining unless put on a far better footing.

Mississippi has a force of seventeen hundred and twelve men. Reports as to its standing have been unobtainable.

Missouri has four regiments of thirty-three companies, a total of twenty-three hundred and eighty-seven men. There is an annual encampment, but the men pay their own expenses and receive no compensation, the State appropriating but twelve thousand five hundred dollars. The encampment of 1891 was held near St. Joseph, but in an unfavorable locality, and the camp was so poorly laid out as to interfere with proper drill and dis-

cipline. The messing was by companies and excellent. The food issued cost twenty-four and a half cents per ration. Guard duty was zealously performed, but with lack of knowledge of its requirements. All desired to learn. Guard mounting lacked uniformity and skill. Drills were constant despite the heat, but showed that the men had not had enough armory work. At review and dress parade there was an improvement. Instruction of officers was daily held. Target practice had received little attention. Setting up was poor, and roll-calls slack. The uniform is the United States fatigue, but was not neat and well brushed. Arms were ill cared for. Considering that the men defray their own expenses, the encampment may be pronounced a success. The men should be taught all minor duties in the armories, and leave the encampment for the larger work. Much may be expected from future encampments.

Montana has one regiment of ten companies, two troops of cavalry, and one battery, a total of five hundred and seventy men. No appropriation was made in 1890 and 1891 for the legal annual encampment, owing to the expense of those of 1888 and 1889. The troops were inspected at their several armories. There is a great difference in the companies. Some of them are a farce, some in a chaotic condition. The artillery company's guns were in bad order; the cavalry company was rarely mounted. It is cavalry only in name. Some of the infantry companies, on the other hand, are good. The *personnel*, largely hardy miners, is splendid, but a lack of instruction is manifest. In some companies discipline is excellent. There is no target practice. A great deal of enthusiasm and soldierly spirit may be seen, but they require systematic development.

Nebraska has by law an annual encampment, but not always an appropriation. In 1891 there was an encampment. The thousand and seventy-three militia are in two regiments of ten companies each of infantry, one four-gun battery, and one troop of cavalry. The State spends fourteen thousand dollars a year on the militia. During the Indian outbreak of 1890–91 the Nebraska troops were under arms. The *personnel* is good; clothing and arms are fair. The cavalry and artillery horses are not well trained. There is no target practice, and at the annual encampment there was not enough work; the picnic idea was uppermost. But the desire to learn was manifest, and at the end of the encampment matters went much more smoothly. The arms and equipments are not uniform or well cared for. Camp policing was good. Messing

was not well systematized. The National Guard needs more support from the public.

Nevada has a battalion of five hundred and seventy-five men, in seven companies. There is an irregular encampment, and occasional public reviews are held. The State pays part, the companies part, of the expenses. Many good riflemen are in the ranks. The members are mostly laboring men, and show a commendable spirit in keeping up the organizations without assistance. But there is not enough support given to the Nevada National Guard to enable it to do as well as its zeal prompts.

New Hampshire has a force of twelve hundred and twenty-nine men in one brigade, or three regiments of eight companies each, one four-gun battery, and one troop of cavalry. The annual appropriation is thirty thousand dollars, and the cost of the annual encampment eighteen to twenty thousand dollars. The annual encampment of 1891 was an improvement on its predecessors. The men were constantly at work. The policing was excellent. Arms were only fairly well cared for. Discipline was very good; all were anxious to learn. The five days devoted to the work are quite too little. There should be more setting up and skirmish drill, more guard-duty instruction in armories, and more target practice. The past year has shown the New Hampshire National Guard to rank high. But there is room for developing the good points already shown.

New Jersey has a volunteer militia forty-two hundred and thirty-three strong, in one division of two brigades, seven regiments, and three battalions. The *personnel* is not uniform. There are many men in the ranks physically defective, whom active service would at once weed out. Arms are in good condition, but accoutrements are not all on hand. The uniform is the United States fatigue, and generally good. Guard mounting and drills are creditable, and there is an efficient signal corps. Target practice is held after the encampment, and is admirable. Rationing is by company, and well managed. On the whole, the National Guard of New Jersey is of a high grade.

New Mexico's National Guard has been much neglected until of late, and is still somewhat chaotic. It has not been well sustained by the Legislature. It is reported as numbering five hundred and eighty-six men. There is a regiment of infantry and one of cavalry, each of five companies, which it is hoped to increase to seven. Drills are fair; arms pretty well cared for; accoutrements lacking. Reviews are unsatisfactory from lack of practice. Considerable

interest exists, and it is hoped that the National Guard of New Mexico will receive more recognition. The members are enthusiastic, but can not build up a militia without public aid.

New York has a National Guard of thirteen thousand five hundred and thirty-nine men. There are four brigades of fourteen regiments, one battalion, forty-five unattached companies, five batteries of artillery, a troop of cavalry, and three signal corps. At the last camp of instruction eighty-three per cent of the total enlistment was present. The State has many armories. The State post and camp ground at Peekskill are excellent. Target practice is held at Creedmoor instead of at camp of instruction. All regiments have not yet been armed with the standard weapon, and in some regiments the equipments are showy but poor. Parades are well done; guard duty poorly. Drills are fair. The encampments show a steady progress; the men are anxious to learn, but the company officers lack instruction. The New York National Guard is of so high a grade that what in their encampment there is found to criticise would in many States be subject of commendation. Some regiments in camp are as near perfect as can be. The State could turn out a larger force of well-trained men fit for active service than any other. But even in New York setting up is defective; the noncommissioned officers do not exert enough authority, and officers, noncommissioned officers and men have not enough instruction. Some special regiments are unsurpassed in quality. The attitude of the National Guard of New York in the late strike at Buffalo shows it more than worthy of high commendation.

North Carolina has four regiments, of six, six, seven, and eight companies respectively, and one company of cavalry, besides two colored companies; total, fifteen hundred and eighty-six men. The State neither pays nor feeds its militia; the expense falls on the men, a matter which will never create an efficient National Guard. Cloth is had from the United States, but the men have to make it up. Battalion drill is simple and good; the spirit of the men is excellent, but the encampment is too much like a picnic. There is no target practice nor instruction in guard duty, but arms and equipments are clean. More work should be done at the encampments, and more instruction be given in the armories. It is a pity that so strong a military spirit as that which prompts the men to continue the National Guard without State aid should not be properly fostered. It is a distinct loss to the State. The fine material should be molded into form.

North Dakota has five hundred and thirteen men in one regiment of nine companies of foot, one battery, and two troops of cavalry. For the 1891 encampment eleven thousand dollars was appropriated by the State, and the same for 1892. The drill was fair; the parades and marching were good. Sentry duty was slack. The men were well employed from 6.30 A. M. to 6 P. M., and decided improvement was shown. Some officers were well instructed, some lacking. Discipline was good, but showed that much was yet to be learned. There was one serious infraction: a company left camp without leave and went home, showing utter want of soldierly ideal. The uniform is the United States fatigue, and as a rule arms and accoutrements were fair. Policing was good, and messing by companies excellent. There is needed instruction in setting up, guard duties, and target firing. The *personnel* is high, and much improvement may be looked for.

Ohio has a legal force of ninety-five hundred men enrolled; a force of fifty-three hundred and seventy-three men armed and equipped, viz., two regiments of twelve companies, one of eleven, three of nine, two of eight, one battalion of three colored companies, one unattached company, one regiment of eight batteries of artillery, and two troops of cavalry. For the annual encampment eighty-five thousand dollars is appropriated. The companies are reported as greatly varying in quality, but are generally good, and the *personnel* is universally excellent. The officers are of a high grade, and the enlisted men of the best material. There are apparently no idlers in the ranks. The guard duty at annual encampment was reported well done, and drill, both company and battalion, fair. One troop of cavalry was reported of very high grade. The men receive one dollar a day, and forty cents for rations. The encampment is for six days. The uniform is the United States fatigue. The arms are mostly the regulation; some of the older ones were battered and rusty, and accoutrements were mixed. Clothing and equipments in many companies were not neat. Messing was by company. Policing was generally excellent, occasionally bad. Roll-calls were slow. The men looked on such routine as unessential. Drills were for three and a half hours daily, and the men showed steady improvement. Setting up was poor, and ignorance of guard duty could be seen. There was no target practice. Discipline and individual behavior were good, but saluting was neglected. On the whole, the Ohio National Guard is in good shape, and able to do excellent service.

Oklahoma has no militia.

Oregon has a brigade of three ten-company regiments, two troops of cavalry, and one battery; total, fifteen hundred and six men. The annual encampment of 1891 cost the State thirty thousand dollars. Few companies had ever seen a battalion drill, but all were eager for instruction. Guard mount and dress parade had to be learned *ab initio*, but were properly taught during the encampment. The sentinels improved rapidly. Work was steady. The officers are fairly competent, the men zealous. Rationing was by contract. The chief thing learned at the 1891 encampment was guard duty. In this the men made great progress. Poor guard duty is a general criticism in almost all the States.

Pennsylvania's National Guard is eighty-four hundred and sixty-nine strong—one division, three brigades, fifteen regiments, one hundred and twenty-seven companies and one independent company, and one battalion of four companies, three cavalry companies, and three artillery companies. The troops are organized, armed, and equipped like regulars. Each infantry company receives five hundred dollars for armory rent; each artillery and cavalry company receives one thousand dollars. The pay of officers is, for the time employed, at the same rate as those of the United States: orderly sergeants receive three dollars a day, sergeants two dollars, corporals one dollar and seventy-five cents, men one dollar and fifty cents, plus twenty-five cents for a reenlistment. The annual encampment is eight to fourteen days, and is by division, brigade, or regiment, but only five days' pay is allowed. The annual appropriation is three hundred thousand dollars, of which the encampment costs one hundred and fifty thousand dollars. The enlistment is for three or five years. Officers are subject to examination, though elected by the men. They have winter schools. Sixty per cent of the men are qualified marksmen; twelve per cent are sharpshooters. Employers are generally interested in the attendance of the men, and the State rules are rigid; ninety-five and a half per cent of the men have been present at the annual encampment. Absence without leave is actually punished, which is not commonly the case elsewhere. The material of the rank and file is of the very best, relatively better than that of the officers, who are of the highest class but not always instructed in their duties. The uniform is the United States fatigue. Discipline is good. Arms and equipments are not well cared for; the setting up is poor, and military courtesy is not usual. There is not much alertness on guard. Too much time is given to parade and review. Skir-

Armory of the Seventh Regiment, New York.

mishing should rather be practiced. The National Guard of Pennsylvania is a division really equipped and ready for the field. Its condition may well be emulated. The late troubles at Homestead, among the most serious labor problems we have ever encountered, and the concentration of the entire militia on the spot, have proved the stanchness of this National Guard beyond cavil.

Rhode Island's National Guard numbers fourteen hundred and thirty-four men, in one brigade of two regiments of eight companies each, two independent companies, two batteries, and a battalion of two companies of cavalry. Nearly thirty thousand dollars is spent annually on the militia. The annual encampment costs eighteen thousand dollars. It is held at Oakland Beach, a locality affording much room for larger manœuvres. Arms and equipments at the 1891 encampment were reported old but in good condition, of United States standard of 1878. The dress is the fatigue uniform of the United States. The men worked hard; from 5 A. M. *reveillé* to brigade drill, ending at 5.30 P. M., there was little let-up. On two days there were sham battles with the entire command. Every man enjoyed the work. Company drills were good; the colored companies proved to be the best in skirmish drill. The cavalry and artillery drilled as well as could be expected with hired horses. Setting up and more steadiness in the ranks were desirable. Guard duty was only fair. Policing was poor. No target practice was held, for lack of a range.

South Carolina has a National Guard of fifty-six hundred and sixteen men, including twelve hundred and twenty-four cavalry and five hundred and forty artillery. The infantry is brigaded. There are five regiments with, in all, forty-six companies, two regiments with fifteen companies, and four unattached companies. There are two regiments of cavalry of eleven troops, four battalions of cavalry of thirteen troops, and five unattached troops. There are three batteries of artillery. The number of men enrolled in the National Guard of South Carolina is large in proportion to its population, but there does not appear to have been much done to discipline the force. There have been voluntary encampments of separate organizations, but no money is appropriated by the State for general or regimental encampments. There have been too many companies raised and too little done for them. The United States fatigue suit is universal, and a dress uniform of gray. There was a centennial celebration at the State capital, which assembled a large number of organizations. The Adjutant General of South Carolina hopes to get an appropria-

tion from the State of five dollars per man passing inspection. The military spirit of the troops is said to be excellent; but without regular instruction, encampments, and inspections, such uniformity as will make the body serviceable as part of a national reserve can scarcely be expected. It is hoped encampments will be held in future.

South Dakota has a regiment five hundred and twenty-six strong, and an annual appropriation of four thousand dollars. "The troops are in excellent condition, well armed and equipped," reports the Adjutant General of the State. An annual encampment is provided by law, but no appropriation is made. The United States has given the State a part of the abandoned Fort Sisseton Military Reservation as a camp ground. Each company has two drills a month; average present, seventy-five per cent. There seems to be a soldierly spirit prevailing, and the promise is of a good National Guard.

Tennessee has one brigade of three regiments of nine, seven, and five companies respectively, a company of cavalry, and a company of artillery; total, thirteen hundred and fifty-seven men. The battery has one twelve-pounder and three Gatling guns. An encampment was held in 1890, and one was intended to be held in 1892. The cost of the militia is about twenty-five thousand dollars a year. Each company receives two hundred dollars for armory expenses. The companies are said by the Adjutant General of the State to be finely drilled, but they have not acquired the habit of working as a body. There are two good military schools in Tennessee, each having a cadet company. It is hoped that the encampment system will be continued, and the National Guard be built up as a body ready for duty as part of a national reserve.

Texas has thirty-three hundred and sixty-eight men. There is an annual encampment at Austin, and twelve hundred and twenty men appeared at it in 1891. The force was a division of two brigades. A battalion of the Twenty-third United States Infantry, a battalion of the Third United States Cavalry, and one battery of the Third United States Artillery also attended. The presence of these regulars was an object-lesson eagerly received by the volunteers. The National Guard is well armed, has Gatling guns, and the cavalry is well equipped. The uniform is the United States fatigue; the two companies of Zouaves should have the dress changed. Messing by companies was excellent. Guard duty began ineffectively, but steady improvement was made.

Company drill was good; battalion drill better than the year before. Cavalry drill is improving. Artillery drill was fair. Dress parade was good. Mob drill was made part of the instruction at encampment. The *personnel* is very hardy and fine. Discipline was good, but saluting was rare. The policing was excellent. Instruction in camp was steady, but many officers and noncommissioned officers were illy taught. There was no target practice. Arms were badly cared for. There was no knowledge of patrol duty or scouting, nor any skirmish drill. The men were badly set up. Great enthusiasm prevailed. A few more annual encampments will make the Texas National Guard a superior body of men.

Utah has no National Guard. It is hoping for a law to establish one.

Vermont has a National Guard of seven hundred and eighty-six men, in a brigade consisting of one regiment of twelve companies, in three battalions, and one battery. The annual camp of 1891, at Bennington, for eight days, cost twenty thousand dollars. The uniform is the United States fatigue. The arms—United States regulation—were in fair condition; equipments old. Discipline was good, military courtesy fair. Officers of excellent stuff, but lacking experience. The men are young, and not well set up. They were so new to the work that the programme made for the encampment could not be carried out. In drill there was much improvement over last year. Field manœuvres were fair. Guard duty was poor; the sentinels were uninstructed. Dress parade toward the end became almost perfect. Target practice was unsatisfactory. At this encampment the West Point Cadet Corps and Battery B, Fourth United States Artillery, were present, and their exhibition drills were highly appreciated. At the Bennington battle-monument dedication the parade was good. The Vermont National Guard is smaller than it should be. During the civil war one tenth of the population of Vermont was in the field; now only one five hundredth belongs to the National Guard. It ought to be doubled in size by adding another regiment. The *personnel* is of the best, and with support by the State, so that good armory work can be done, the annual encampments will end by making a fine body of men which will be a credit to the nation.

Virginia's National Guard—"The Virginia Volunteers"—consists of twenty-eight hundred and forty-four men, in one brigade of four regiments of thirty-four companies, with two unattached

companies, one regiment of cavalry of six troops, one battalion of artillery of four batteries, and two battalions of colored infantry of ten companies. The appropriation of the State is ten thousand dollars; the organizations pay their own expenses. There is no general encampment. Many of the companies are finely trained organizations, but they do not make one body; they are a mere aggregation. Every one knows the military spirit which has always prevailed in the State, and the splendid education given in the military academies. But to perfect her National Guard as a body, there should be annual encampments, and the several organizations should be taught guard duty and skirmish drill, and be given a thorough training. Only thus can the holiday element be eliminated, and her National Guard be made a homogeneous part of the national reserve.

Washington has a brigade of two ten-company regiments and two troops of cavalry; total, eleven hundred and forty-five men. The annual encampment costs twenty-three thousand dollars, raised by a special tax of one fifth of a mill on all property. The body is a promising one, considering its difficulties.

West Virginia has two regiments of fifteen companies—seven hundred and twenty-eight men. Her annual encampment costs eight thousand dollars. Each company has an armory, paid for by the State. At the encampment of 1891 arms were reported in bad order, but soon to be replaced by the latest pattern. Equipments were fair, with United States fatigue uniform. Most companies had also full dress, but no overcoats. Rations were good; cooking was defective. Guard duty was new to all the men. There had been little setting up and company drill, but improvement was seen in both toward the end of the encampment. There was no target practice. Discipline was good. Reviews toward the end of the period were fair. Health was not good; thirty-five per cent attended sick-call from change of water and other complaints. The men are only paid when in active service. The material is good, but instruction is much needed.

Wisconsin has four regiments of foot, of ten, twelve, eleven, and seven companies respectively, with five independent companies, one squadron of cavalry, and one battery; total, twenty-seven hundred and thirty-seven men. The militia expenses are seventy-four thousand dollars annually. There is no general encampment—only regimental. At these the men get one dollar a day, and the officers are paid United States rates. The State pays armory rent. The military duties are fairly done, but drill is

slow and inaccurate. The companies assemble but one week a year. Target practice is not of the best; parades are good. The Third United States Infantry in 1891 camped near by, but only friendly intercourse existed between them and the volunteers—no official connection. As an object-lesson the presence of the regulars was invaluable. Work was constant for the period of the encampment. Review and inspection were fair. The march past was steady. Some raw recruits in the ranks spoiled the manual. Arms were generally unsatisfactory, but equipments were fair and uniforms good. The men were illy set up, but eager to learn. Officers were intelligent. The policing was, in general, excellent. Discipline was fair, but lack of instruction was apparent. In one battalion better training was observed, and the result made an organization of much higher merit. The cavalry, under the circumstances, was good; the same may be said of the artillery. The policing of the camp of one organization was poor, owing somewhat to the number of visitors. With more uniform rules the Wisconsin National Guard would be an effective body.

Wyoming has a regiment of seven companies, of three hundred and nine men. There is an annual encampment of seven days, but too large a part of the expenses falls on the men. The companies are far apart, and have a regimental organization only in name. At the 1891 encampment, at Laramie, the Seventeenth Infantry joined the National Guard. The men were zealous, but had never had battalion drill before. Drills and parades were naturally full of irregularities. Guard duty was poor from lack of instruction, but improvement was manifest each day. There was a want of setting up; otherwise a creditable appearance. Arms in some companies were clean, in others dirty; accoutrements were fair. Policing was good. Comradeship with regulars was marked; the fraternization was complete; the volunteers were eager to learn, the regulars eager to teach. The *personnel* of the volunteers is fine. There is needed a better armory drill in setting up, guard duty, and skirmishing. Target practice was fair.

The reports of the United States inspecting officers for the 1891 encampments were unusually explicit; and the status of the several bodies in that year has therefore been adopted.

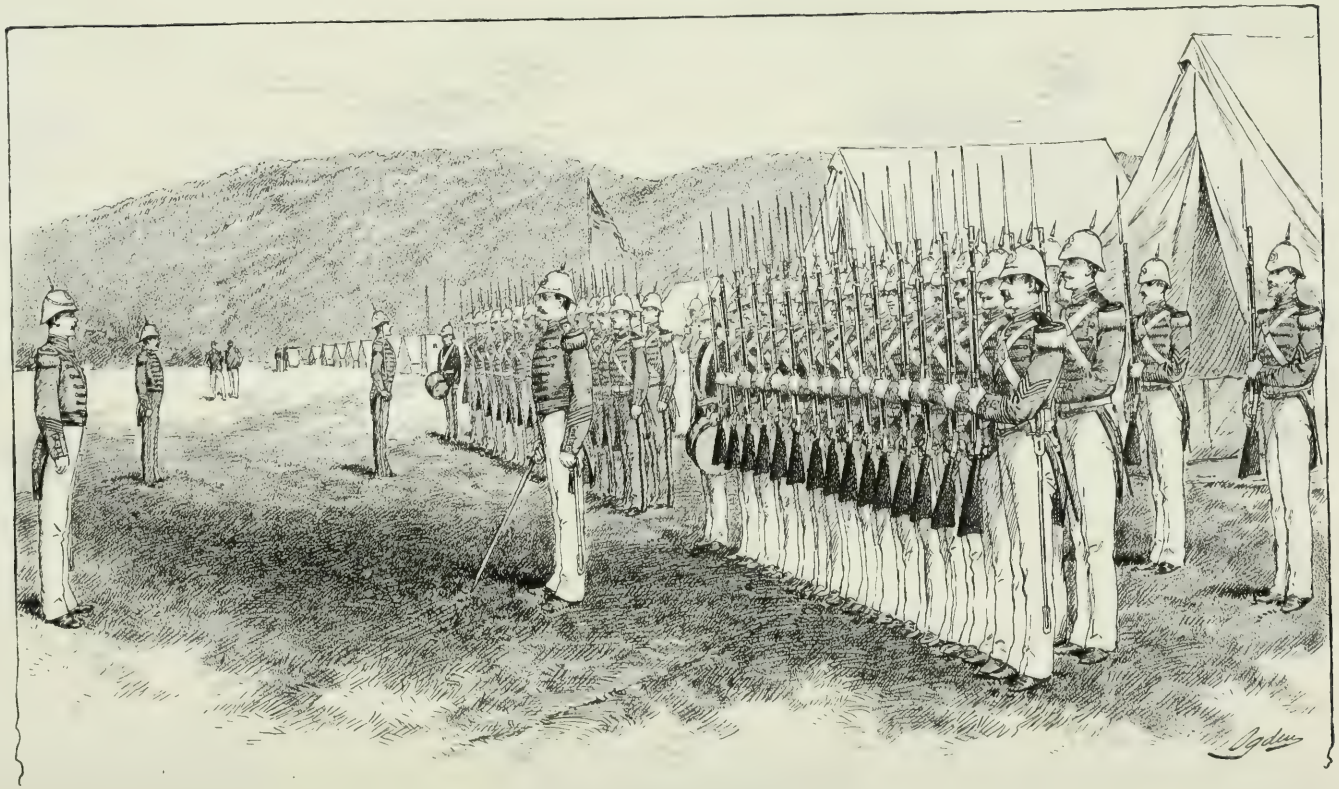
It may be noted, as a general observation, that these forces are as yet only a promising body of men, by no means an army. How

to make them into an efficient force ready at any moment for the field, is the problem before us.

The *personnel* of the National Guard is of the very highest. It is doubtful whether even Prussia can boast the make-up of our militia, despite the large proportion of her one-year men—i. e., those who have passed the equivalent of our college curriculum. There is less technical and book training, but more independence and self-reliance, in our ranks—the very element sought for to-day in all soldiers. In some of the companies the highest social element is represented, and throughout the whole force there is nothing left to be desired in the grade of men. It is the universal testimony of the United States inspecting officers that there were very few idlers in the ranks, scarcely any who represented the loafing element. Nine tenths of the men belong to the National Guard at a marked personal sacrifice, and from love of the work. The average age is probably about twenty-five. Relatively speaking, the stuff of the rank and file is superior to that of the officers, who are not proportionately more intelligent, nor in their sphere so well educated or trained. The men are usually their equals in intelligence; they assimilate their training and simple lessons quickly. The officers have so much more to learn that they do not reach, for their position, so high a grade of efficiency.

There are in some States too frequent changes in the *personnel* by shifting of residence. This is to a certain extent unavoidable under State government of the militia. Should the United States be given a general supervision of the National Guard, the man who left one company could be provided with a transfer to the company nearest his new domicile. At times, owing to these changes, there are so many new recruits in the ranks of some companies that instruction falls far short of its proper usefulness. The strength of a chain is the strength of its weakest link; so with a company.

It is to be much regretted that in some States a considerable part of the expense of a military company falls on its members, owing to the inability or unwillingness of the State Legislatures to appropriate sufficient moneys. This is onerous, and ought not to prevail. To make an efficient national reserve, all the expenses incident to thorough instruction and discipline, as well as clothing, arming, and equipping, should fall on the public. In a few States the men attend encampments at very marked personal loss, forfeiting their own wages at whatever their business, being compelled by employers to find a substitute before being permitted to



Day and night guard.

leave, and receiving no compensation from the State. In more States the employers look favorably at the matter, and freely give leave of absence from their work to all militiamen. In other States the employers take small interest in the militia, and are noncommittal in the premises—not wanting, meanwhile, to have their business suffer by the absence of their workmen. Again, the whole cost of the uniform falls on the men in some States, or the cloth is issued to them and they have to pay for making it up, which is the bulk of the cost. It must take a keen relish of military affairs, or else a strong sense of patriotism or duty, to enlist in the militia under these circumstances. Moreover, some of the very best men are held back from enlistment because of the attendant expense—a matter much more to be regretted. So long as the volunteers are solely under State control such things are unavoidable.

The question of uniform is much debated. Many of the old historical organizations oppose any change in their inherited dress and trimmings. It is believed by others that, in order to retain the interest of the public, it is essential to have a gaudy uniform; that, as the militia encampments are the only things which catch the public eye, the useful should be sacrificed to the showy in order to win public approval. It is no doubt true that, in this country, appeals have to be made in this manner to the public purse. But the uniforming of the troops should be alike in every State at the annual encampments; and while there is no objection in local parades to any distinctive uniform or trimmings, when the troops come together in a body for the instruction which can be given but once a year, they should all wear the same dress. And there is nothing, on the whole, so useful, serviceable, and appropriate as the United States fatigue dress. More than one uniform is unnecessary, and should not be taken to camps of instruction. This fact is practically appreciated, and within a year or two there will be few organizations in the country which will not wear to the annual encampments the fatigue dress of the United States Army.

So far as regards discipline, the main factor—willingness to learn—is apparent. Zeal, readiness to receive instruction, desire to excel, are clearly manifested. But the universal laxness in the simple matter of salutes, reported by all the inspecting officers, shows that the habit of the soldier has yet to be acquired. Saluting one's superior is not discipline; but it is a common manifestation of it, and military courtesy lies at the root of obedience.

Such discipline as is to be found among troops hardened by the dangers and exposures of the field is not to be expected in militia in times of peace; but such discipline as can be enforced in an annual encampment is essential. It is thought by some inspectors that the volunteer militia can never be brought to a habit of saluting; that it is not essential—scarcely desirable. But in the very best volunteer organizations military courtesy is cultivated to as high a degree as in the regular army. The men take as much pride in a soldierly salute as in being well set up. While we know that a mere salute, as a salute, is not material, we also know that the salute, as a manifestation of discipline, may be of the highest importance.

It is noticed in many encampments that the men do not answer sharply to roll-call, but saunter in in a larking way savoring little of the soldier. Not that there is any antagonism to the restraints of discipline. On the contrary, the men show every disposition to respond to all that will reflect credit on their command; but the habit is not enforced by enough practice to produce the promptness which is characteristic of the true soldier. Promptness at roll-call is one of the most essential things. It means promptness in other duties.

Again, on going through the militia camps one is struck by the immense amount of baggage brought by the men. Far from carrying all that he needs in his knapsack, each man has a valise or handbag, and many bring trunks. This is an absurdity to which there should be put a speedy end. As the encampment lasts generally but a week, a single change of underclothing is all any man can need. Should it last a month, the men should none the less be held to no greater amount of baggage than the regulars. To learn to dispense with home luxuries and comforts is one of the earliest lessons of discipline.

The main defect so far of all the volunteer militia is that too much time is devoted to those things which make for show, and too little to the solid and more essential. The setting up of the men is by no means carefully looked to. It is rare that the militiaman has the soldierly appearance of the regular. He is apt to keep the independent swing, often the slouch, of the country-bred citizen. It is universally acknowledged that, next to the bearing and manners of the cultured man of the world, the bearing and manners of the old soldier are the best. I have often been struck by the exceptionally good manners of some man who in other respects had nothing distinctive in education or social position;

and an inquiry has traced his bearing to a term of enlistment in some regular army. This habit of courteous and soldierly behavior is to be cultivated. No perfection can be had in drill or manœuvres without a thorough setting up, which is the basis of a good carriage. This is armory work, and needs the careful attention of the officers of the National Guard.

That the volunteers are not averse to these things is clearly demonstrated by the admiration they show for the way things are done in the regular camps, when these are near their own. "I wish they would make us do things that way!" is a not infrequent remark by a volunteer who admires the orderly, quiet, and soldierly aspect of a camp of regulars.

In the manual of arms a few militia companies are as expert as or occasionally more expert than is common in the regular army. In guard mounting, the parade part of the ceremony is well understood and carefully executed; but the duties of the guard or the work of a sentinel are taught very superficially, if at all. Yet guard duty lies at the root of the safety of an army.

Sentinels, as a rule in the annual encampments, show that they know nothing whatever of the purpose of their work; have no conception of what to do on post. The guard details are not large enough to give every man a turn at sentry-go; few learn anything, for the officers themselves have exceedingly limited ideas on this most important subject. Guard-duty manuals should be in the hands of all militia officers, and should be carefully studied. The rudiments of sentry duty can be readily taught in the armory. The instruction would be a relief to the dull uniformity of manual and company movements, and the men would enjoy learning a new thing, and a thing, moreover, which has so great importance in actual warfare.

In drill, those manœuvres which are of utility in dress parade or reviews, such as forming column from line, marching past in column and reforming line, are carefully practiced, and are often skillfully conducted; but the more important skirmish drill, to-day the foundation of all fighting manœuvres, is not taught at all. This is a serious defect, but one easily remedied with some painstaking.

Heavy skirmish drill is the basis of the fighting of the next war. It should become part of the militia drill. Men must learn to depend on their own individuality. The old touch of elbows is a thing of the past. In the limited space allowed by the armory it may be more difficult to teach this essential art; but in camp

less time should be given to parades—even if the public does crowd about to admire—and more to the skirmish drill. The public will soon learn to appreciate the latter.

One item can not be overlooked. The basis of all instruction is time. The term of five or six days during which the troops are usually encamped is utterly insufficient; ten days scarcely suffices for the most superficial training. To be in camp over one Sunday would not be without its advantages. Sunday-morning inspection is a ceremony of no little utility. So long as the entire control and expense fall on the several States more time can not well be expected; but the prevailing short period of assembling troops will never make a good national reserve out of our present volunteer militia, however promising the material. Nor can such drill as is most efficacious be insisted on until the United States shall have a voice in controlling the militia.

The company drill, and often the battalion drill, of the National Guard is good. In some States it is all that can be desired, in others only fair. But as a rule it can be much commended, except that it makes for show rather than for service. In the guard duty and skirmish drill all the volunteers are deficient. This is not astonishing, but it should be corrected.

Arms and accoutrements appear to be not well cared for. It would be worth while to have good armorers in all the armories, as there already are in some; but, after all, the care of his arms and accoutrements must eventually, and properly should, fall on the man himself. He should learn from the armorer how to use, clean, and preserve his piece, and should then be held responsible for it, though it remains in the armory racks.

The grades of care shown in the matter of arms are as various as the grades of intelligence and energy in the officers. This is true of all troops, regular and volunteer. The condition of the company will reflect the intelligence and ambition of the captain.

Target practice is everywhere coming much into vogue, and in some localities great strides have been made in it. The percentage of men who are marksmen and sharpshooters constantly grows. This is work in the right direction and will continue to be fostered. Years ago it was on the frontier that the school of the rifleman was to be found. To-day the good marksman exists where target ranges are most common. In some States target-shooting is held to be as important as the annual encampment.

Patrol duty and scouting are rarely taught, but can be advantageously made part of the instruction of the encampments. Mob

drill and the details of street attack have in a few instances been introduced. The attack and defense of a camp, the establishing and defense of a picket line, are subjects of instruction which are of the greatest importance, but which are all but unknown in the militia. If armory drill is utilized not wholly to give men a perfect manual, but to teach them the principles of guard duty and skirmishing, there will then be time at the annual encampment to give instruction in the minor operations of war, and to undertake manœuvres which simulate actual war. This is what is most essentially needed.

Practice marches with full kit should be a part of each encampment, but are wont to be found in few. The parade or picnic idea still prevails. Encampments take place where the matter is *en évidence*, and those things are done which attract favorable comment. Perhaps this is a necessary means of gaining popular support; but it were far better to have the encampments consist solely of work rather than largely of show or play. The system of prize drills, which in many places create jealous competition and foster heartburnings, is far from wise. The company whose manual or whose wheeling is most perfect may be the least useful. If a company should perfect itself in guard duty or skirmishing and lack somewhat of the *click-clack* of the manual, it would still be far superior to a company whose knowledge was confined to the automatic movements of their pieces, however accurate. Very few troops in campaign retain their manual steadiness; but they daily grow stronger in usefulness for war. The farther from the crowd of onlookers an encampment can be the better, so far as instructing the men goes. Other means of making the National Guard a popular institution should prevail rather than prize drills and dress parades. It would not take long to show the public wherein resided the soldier's greatest value, or lead to its due appreciation.

The policing of the camps, which are generally large and well-selected grounds owned by the States, is wont to be good. In the South they are sometimes policed by teams of hired negroes; but the facilities are such that the troops do not learn what would enable them to police a camp pitched in time of war in any less advantageous locality. Perhaps this is among the things which can only be learned by actual campaigning. But it would be well if the troops had time to set up and police the camp themselves. The same observation may be made with regard to the rationing of the men. Either the company officers or regimental quarter-

master, or some other official now makes arrangements to mess the men *en bloc*. This of course gives the National Guardsman no idea whatever of what he would have to do in order to cook his own rations in time of war. It may be impracticable to give this training, but some approach to it could be tried. The rationing of the men is usually done by contract, on a more or less large scale. It would be well, perhaps, if each company could do its own cooking, so as to let the men see this side of camp life, instead of having everything made too easy for them. In some camps the food is too rich and varied. The United States ration alone would be better and healthier.

The necessity of a national reserve for use in time of public danger can scarcely be disputed. If danger comes, it will be sudden and will need to be suddenly met. That it is not wise to have a large standing army is the undoubted sentiment of the American citizen, and this sentiment is to be respected. We have in our National Guard a well-prepared clay which we may without great expense mold into a thoroughly national force of the people, and which may act by the people for the people. In what way shall we to the greatest advantage utilize this body?

That it must be done by the General Government is imperative. Not that the forces shall be removed from the control of the States, except when called into the service of the United States. This is not permitted by the Constitution. But under the control of the several States this force can be nationalized and subjected to longer and better discipline than it now receives.

Congress has by the Constitution two powers—"to raise and support armies," and "to provide for organizing, arming, and disciplining the militia." To act under the first power is but to increase the permanent establishment—an undesirable and expensive matter. Under the latter provision Congress may utilize what is already a nucleus, and, being created by the States and composed, as a rule, of the best elements, will make a force distinctly more in accordance with our American ideas, and more apt to win the approval and support of the people than a large regular army ever can.

Weaknesses have been pointed out in the material of which the volunteer militia is now composed—such as the migratory nature of our people, which fact would constantly be withdrawing from the ranks of a national reserve individuals who transferred their domicile to a new place. But this, as already shown,

would affect only a small percentage of the men enrolled, and could be met by fresh enrollment of the migrating individual in his new domicile. Were the objections which might be urged many fold greater than they are, the fact that the National Guard now numbers in its ranks the best young men of each community is a prevailing reason for building on it as a foundation rather than to seek a fresh means of raising men. Whatever advantage there might be in a more centralized force, the certainty of its not meeting popular approval condemns it.

The material is unquestionably of the best. The question is how to instruct and discipline the material so that it may reach a condition of greater availability for active duties. To-day the force is not available, owing to lack of training and of soldierly habits, and the want of homogeneity in the whole body. No amount of zeal will replace training. A part at least of the discipline of the regular soldier must be bred upon the patriotism of the citizen. Soldierly ambition the National Guard has in abundance, but it has not yet acquired soldierly habit. Every one familiar with military efficiency knows that the value of a regular force resides in each man's having done certain things until they have become second nature, and he instinctively does these things. However excellent some of the companies or regiments of the National Guard may be, it is plain that they have not yet acquired that habit of obedience which is the soldier's greatest virtue, which makes it all but impossible for him to do otherwise than he is ordered to do or than he is used to doing. This habit in no wise conflicts with the soldier's intelligent initiative, so keenly sought to-day. The two march hand in hand.

It will be readily acknowledged that the best results can not be accomplished unless the active militia be, to a given extent, taken from the several States and put under the authority of the United States—or at least unless a right of general control be yielded to the United States by the States. Uniformity can not otherwise be obtained, nor that impress made upon the force which will produce the homogeneousness essential to the best conditions for war. But the United States can not assume sole control. The President has the right to call the militia into the service of the United States only "to execute the laws of the Union, suppress insurrections, and repel invasions." The provision for "organizing, arming, and disciplining the militia" does not permit the General Government to assume control of the National Guard, or to treat it as a part of the regular establishment.

This is, in fact, just what is not to be desired. What induces the very best element to enlist in the National Guard is the fact that it is a State institution. State pride is strong, and this is one of the strongest manifestations of it. But so long as the National Guard can remain a State corps, all its members would be glad of such United States control as should make it perfect as a military body. This has been clearly shown by the system of inspection of the past few years.

Americans do not lack the military instinct. At the Paris Exposition of 1878 a company of marines was sent over to act as guard for the United States department. The men had been specially selected for their good behavior and soldierly bearing. They wore the simple fatigue dress, but were by far the best looking detail on duty. "Have you seen the American soldiers?" was in every one's mouth. Our countrymen showed commendable pride in these men. When a military duty is well done it does not always fail of commendation among us.

It is probable that if the United States would assume certain portions of the expense of maintaining the active militia, the States would yield up so much of their control as would suffice to accomplish the end sought. It is not desirable that the National Guard shall be made too much of a national force; it is better that it should remain a distinct State organization. The fact that it is provided by the Constitution that the officers shall be commissioned by the Governors of the several States, would of itself retain the home flavor.

The readiest way to secure such a transfer as is desired of the militia organizations from the States to the national Government would be to offer inducements to the National Guard to enroll itself as a national reserve, which inducements should be coupled with the obligation to undertake such additional drill and work as shall make the enrolled bodies more efficient. The inducement must be pecuniary, a thoroughly liberal per diem for the time spent in armory work and in camp of instruction; the obligation that of giving up a certain number of evenings a month to drill and schooling, and of attending camp of instruction at least one full month in each year. It may be set down as settled that less than a month, plus the evening drills, will not suffice to make a force which can be considered fit for its work. Even this much will suffice only with the most intelligent element.

The present staff corps of the regular army can without difficulty, by additional clerical aid, attend to the wants of the na-

tional reserve. Abroad, no greater staff corps control hundreds of thousands of men; and our American genius for administration forbids the necessity of a largely increased force. Special staff corps for the national reserve are not essential. In fact, it is better to have our present regular army become interwoven in interests and duties with a national reserve; for, in case of war, they must work in unison, and it is better to have already made acquaintance. Each State now has certain staff officers, who can be utilized, and any additional officers necessary had better be commissioned by the State, though paid from the national Treasury, and responsible to the War Department at Washington.

There would have to be a certain number of instructors and inspecting officers for the national reserve. The latter could readily be detailed, as they now are, from the regulars; the former would have to be appointed in sufficient numbers, and would be of no utility unless men of ability and regular training. Here is a field for retired officers of the army. The inspectors would perform their duties mainly at the annual encampment, but could make tours at regular intervals through the armories and report thereon to the Inspector General at Washington. There would be no difficulty in detailing fifty such inspectors from the present regular forces.

The instructors would have to be more numerous, and would be constantly at work, going from armory to armory in their respective States, lecturing to officers and men, showing the company officers how to perfect the training of their men, overseeing the training of the noncommissioned officers, and generally watching the effect of the instruction they themselves impart and that of the State officers.

There are unquestionably many organizations in the active militia of the several States which would be glad at once to enroll themselves as a body in a national reserve. There are certain seasons of the year when nearly all the enlisted men could give a month to serious military work, if properly paid for it. Unless a man could do this he would be unavailable. Once well started, such enrollment would be a matter of pride, and would be eagerly embraced. Such members as could not give so much time would be dropped, and others would take their places. There is no doubt that at least as large a force as is now carried on the State muster rolls as active militia could be enrolled in the national reserve. It could probably be doubled if desired.

The main thing would be the inducement, and this could be

made liberal. A per diem of two dollars a day to each enlisted man, a higher rate to corporals and sergeants, and the equivalent of the United States Army officers' pay to each officer in a month's encampment, would amount to but six million dollars a year, and of this amount the States are now paying a large part. To add to this fifty cents for every attendance at a three hours' weekly drill or lesson, to be given in the evening, say forty in the year, would be two million dollars more. Without a liberal per diem the national reserve could not be made either attractive or popular, or, in other words, successful. It has been claimed by some that to pay the National Guard more than a pittance would be apt to invite the loafer class to enlist; but this is not probable. Some States now pay their National Guard as much, and they are the very States which have the best material in the ranks; and steady work would soon eliminate the loafers.

The organization should be made similar everywhere. The infantry should be in battalions of four companies each, three to the regiment, suitably officered. The brigades and divisions should be put on a regular basis. The bulk of the national reserve would be infantry. It is questionable whether cavalry and light artillery can be made effective under militia organization; the question of horses is too serious. Unless horses are kept solely for this purpose they can not be trained to a high enough degree. Both these arms are better left to the regular forces. There might, however, be to advantage a battery of Gatling guns in each brigade.

The maritime States might enroll part of their quota in heavy artillery companies. This would be especially useful when our projected system of coast defenses takes on a definite form.

Under the Constitution the officers of the national reserve would have to be commissioned by the Governors of the States. But they could be subjected to examinations which would prevent any but competent men from remaining in command. A board of part regular and part State officers could be constituted, which would gradually strike all but suitable officers from the rolls. The subject of examination would relate strictly to their capacity to drill, discipline, and command the men under their charge.

The period of enlistment should be five years; the age from eighteen to thirty. The oath of enlistment, in addition to the State requirement, would be to bear allegiance to the United States and to answer its call for active duty.

Light Horse Squadron, Milwaukee, Wisconsin.

In many States attendance at stated armory drills, which occur several times a month, is enforced by a system of fines, collectable by process. This appears to be the simplest manner of exerting an authority over National Guardsmen, and could be continued to advantage. A given number of drills, lessons to noncommissioned officers, and lectures to officers should be provided and rigidly carried out. Nothing short of absolute inhibition of skylarking, so prominent among militiamen, will do.

As to arms, accoutrements, camp and garrison equipage, etc., the reserve should be made so far as possible to conform to the regular forces. It might take some years to perfect the change, but the active militia is now so nearly armed and equipped according to United States regulations that the rest can be readily completed. It is merely a question of expense, and not a great one at that.

Just where the line of demarcation between State expense and the United States disbursements should be drawn it might be difficult to say, as some States are very generous to their active militia, and some do nothing for it. But those States which now provide amply for the National Guard would continue to do so on the same basis, and the premium on enrolling in the national reserve would soon tempt organizations in the backward States to emulate the others in adding to the quota of the country's *Landwehr*.

The United States now distributes four hundred thousand dollars a year among the States in arms and material. If, in addition to this sum, it should suitably pay the men for the month in camp, for each attendance at armory drill or lessons, the burden would be equitably divided. All the States would unquestionably do the rest, especially if the donation of stores and arms and the payment of its portion of the national reserve were made dependent upon such action.

The country can better afford a liberal scale of compensation to the national reserve than to have a national reserve of no particular value. Men who do not attend should be fined, or dismissed for constant nonattendance. Men who make no progress or who do not seek to learn should be similarly got rid of. The matter must be on a basis as serious as the work of the regulars, and with one evening lesson a week and thirty days in camp the exceptionally intelligent material which could be got together—which is now together—could be brought to such a degree of efficiency as to be available at any moment.

The rationing of the national reserve in its encampment would best be done by a commutation, say forty cents a day to each organization for each man present, to be paid to its commissary. Any saving could be made a company fund, of which the several companies would be proud. It could be used for armory improvements and many military luxuries, which would heighten the value of the company in the eyes of its members.

The State encampments need not be interfered with, but a national reserve would afford opportunity for larger encampments, speedy mobilizations, and manœuvres. The United States is readily divisible into ten military districts, with from seven thousand to thirteen thousand troops in each, of which the smaller groups are those most likely to increase in numbers, viz.:

	Strength of national reserve about
1. New England States	12,800 men.
2. New York	13,500 "
3. Pennsylvania, New Jersey, Delaware	13,200 "
4. Maryland, District of Columbia, Virginia, North Carolina, South Carolina	13,500 "
5. Georgia, Florida, Alabama, Mississippi	10,300 "
6. West Virginia, Kentucky, Tennessee, Ohio, Michigan	11,300 "
7. Illinois, Indiana, Wisconsin	9,600 "
8. Iowa, Minnesota, Dakotas, Montana, Nebraska, Wyoming	7,300 "
9. Louisiana, Arkansas, Kansas, Missouri, Colorado, New Mexico, Texas	11,200 "
10. Arizona, California, Oregon, Nevada, Washington, Idaho, Utah	8,000 "
Total	110,700 men.

A part of the troops from each of the States in each district should be annually assembled for the larger instruction of division manœuvres. The entire national reserve could perhaps not be assembled, but proficiency at the State encampments could be made a test for the selection of companies and regiments to be allowed to take part in the manœuvres of the military district. It is not essential to have permanent grounds for district encampments. Better results would flow from each encampment taking place at different localities and on different terrain. There are numberless places where open ground can be found which is suitable for such encampments, and the experience engendered of the troops preparing their camp and rationing themselves would be valuable.

Such a district encampment would be under the command of a regular officer detailed for the purpose, and as many regular

troops would be added as convenient. Intrenching field works could be practiced at such encampments; if near the sea, co-operation with a fleet, or the defense of the coast against landing parties. The instruction at such a camp would be broad and on a large scale. The troops would have already learned the minutiæ of drill, and could grasp the share taken by each arm in the larger operations of war—such as the passage of streams and defiles, their defense, reconnoissances in force, skirmishing over a large stretch of country, and the manœuvres of an army leading up to battle.

All this could be prepared in advance, the troops to participate being selected, the commanding officer having time to visit the ground to be utilized, and to draw up his scheme for the manœuvres. Proper staff officers should be likewise detailed in advance, so that there should be no delay in carrying out a proper plan in all its details.

Such a camp should be quite sundered from the picnic idea now prevailing. While some visitors might be allowed on Sunday, and perhaps one afternoon a week, at no time should the work be allowed to be influenced by crowds of sightseers.

In addition to the district encampment, there may also be a national encampment. In this the very pick of the State troops, those organizations which have shown the greatest skill or the most marked progress, should be allowed to participate. The national encampment might be held at some place having a peculiar strategic value—the Canadian frontier, the coast near our larger cities, or some locality which in case of war would be apt to be the object of attack.

That such a system of district and national encampments would foster emulation among the militia organizations is unquestionable. To attend the national encampments would be deemed a high honor, and if ten per cent of the entire National Guard was annually selected for this distinction it would have a strong effect for good on the service. The best troops from each State would here meet, and their intercourse and mutual work would strengthen the national bond, while preserving the strong State feeling which is our best heritage.

Target practice could be fostered by selecting certain of the best shots to go to the national encampment as a body of sharp-shooters. It would be a handsome premium on success.

The cost of the State encampments would still remain partly

to the State; that of the district and national encampments would be defrayed by the United States.

The cost would be:

Pay of 10,000 men to national encampment,	21 days + 5 days' travel = 26 days	$520,000
" 36,000 " district "	14 days	1,008,000
" 80,000 " State "	7 days	1,120,000
Rationing 10,000 men 26 days		104,000
" 36,000 " 14 days		201,600
" 80,000 " 10 days		320,000
Transportation, say		1,000,000
Horses, forage, etc., say		500,000
Armory drill and instruction, say		350,000
Total		$5,123,600

The above table of cost may appear to be a stumbling-block. But as nearly one hundred and forty millions are paid out annually in pensions for the civil war, and a large part of it fraudulent at that, it would seem as if, to protect the property and honor of the present generation, so small a sum as five million dollars a year—or, with the increased pay above mentioned, seven millions—could well be appropriated by Congress.

There has been no attempt to go into minute details of the scheme. It has been only outlined; but on these lines, if Congress will undertake the business, such a national reserve can be created in two or three years as will place us on a footing to fear no attack by any power whatsoever. Is it not worth while to foster our National Guard in the manner suggested? That the element now enlisted, or procurable by a proper equivalent, is worthy of all support, has not long since been abundantly demonstrated by the commendable conduct of the troops in the difficult conditions existing at Homestead and Buffalo.

The hints herein given are not new. The subject has been canvassed at length among army men, and discussed with particular ability by several officers in the Journal of the Military Service Institution. We do not need a large regular establishment; we do need a *Landwehr* in its very best sense. We do not need soldiers to send abroad on service; we do need a force to man our coast defenses and a reasonable national reserve. To have less is a national folly, of which we are some day likely to repent.

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